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REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

TANZANIA STRATEGIC CITIES PROJECT – ADDITIONAL FINANCING (TSCP - AF)
(IDA CREDIT No. 5460 - TZ)

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR PROPOSED ADDITIONAL INVESTMENT SUB-PROJECTS IN KIGOMA - UJIJI MUNICIPALITY

FINAL REPORT

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EXECUTIVE SUMMARY

The Government of Tanzania (GoT) through the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG) now known as The President's Office Regional Administration and Local Government has been implementing the Tanzania Strategic Cities Project (TSCP) in selected urban Local Government Authorities for 5 years financed by a World Bank (IDA) credit and a grant from the Government of the Kingdom of Denmark.

TSCP is an investment operation that provides finance for critical infrastructure in 4 cities of Mwanza, Tanga, Mbeya and Arusha; 4 Municipalities of Ilemela, Dodoma, Kigoma-Ujiji, Mtwara-Mikindani and the Capital Development Authority (CDA). However, Ilemela Municipality came into the list of the participating LGAs after its establishment upon splitting of the City of Mwanza.

The Core TSCP sub-projects have involved upgrading/rehabilitation of a number of artery urban roads and drainage and associated structures such as drainage ditches, culverts/bridges, footpaths and street lighting and local infrastructure such as bus and lorry stands aimed to improve movement of people, goods and services in the urban areas.

The facility also funds development of infrastructure to improve solid waste management including solid waste collection centres, equipment for transportation and disposal, and the development or improvement of disposal sites. To date, most of the prioritized infrastructure are complete and in use or in final stages of completion.

Brief Description of the Proposed Additional Financing

Some areas of the completed infrastructure in the participating LGAs have been identified to require further improvement. In addition, there are infrastructure facilities which were not financed under the Core TSCP due to limitation of available funds under the credit. Those are new sub-projects identified to be important for the functionality of existing sub-projects. Based on these identified gaps, GoT is preparing a credit – *Tanzania Strategic Cities Project - Additional Financing* with a view of financing these additional infrastructure investments and coupled improvements of management capability of the 8 urban LGAs and the CDA currently receiving funds from TSCP.

So to say, TSCP - Additional Financing will fund civil works construction costs mainly involving extension and rehabilitation of existing infrastructure with few completely new structures.

The Development Objective of the proposed AF remains the same as for the Core project, to improve the quality of and access to the basic urban to basic urban services in the selected authorities. The AF sub-projects will be implemented to cover eligible investment projects of road and drainage infrastructure; urban transport infrastructure and; solid and liquid waste management.

The investments subprojects in Kigoma Municipality include rehabilitation/ construction of the following:

i. Construction of one additional landfill cell at Msimba landfill.
ii. Extension/Improvements to storm water drains at Lubengera and NHC Katubuka
iii. Improvement to Bus Stand and,
iv. Rusimbi Road Upgrading (1.1km)

Objectives of the Environmental and Social Impact Assessment (ESIA)

This ESIA has been prepared according to an Environmental and Social Management Framework (ESMF) prepared by TSCP AF in 2014 for environmental and social screening process. The objective of this ESIA is to ensure that the proposed infrastructure development interventions are implemented in an environmentally and socially sustainable manner. The ESIA screening process aims to ensure that Kigoma Municipality has strategies to identify, avoid or minimize and mitigate potential negative environmental and social impacts during the planning stage for the construction of the sub-projects. This ESIA presents definitive, conclusive and clear procedures consistent with the laws in Tanzania and the World Bank's safeguard policies.

The ESIA for the Core Urban Infrastructure and Services component of TSCP (constituting rehabilitation/upgrading of urban roads and drainage and solid waste collection and disposal infrastructure) were conducted and approved by the VPO and NEMC in 2010 and the Municipality was awarded an Environmental Certificate No. **EC/EIS/257.** The environmental and social assessment and management process for Kigoma Municipality responds to the World Bank Safeguard Policies and to requirements specified in the Tanzania ESIA and Audit Regulations, 2005 (Part IX, Regulation 42, Sub-regulation (1); (2)(b); and (4)) dealing with approval of changes to a project with a valid ESIA Certificate.

As mentioned above, the TSCP obtained EIS certificate for proposed works with conditions attached in the certificate after verification of the carried out ESIA study between August and November 2009. However, the EIA regulations of 2005 GN No. 349 of 2005 allow for variation on issued certificate for any additional works where the developer is required to fill in Form No. 5 of the regulation, though that will not apply to this case since the additional sub-projects are part of the previously selected and designed sub-projects approved by NEMC only that they could not be carried-out due to the limited funds availed for TSCP by then.

The World Bank Safeguard Policies require that, before a project is appraised, relevant safeguards instruments, such as an Environmental and Social Impact Assessment (ESIA) containing an Environmental Management Plan (ESMP), or just an ESMP, and if the project requires it, a Resettlement Action Plan (RAP), will be locally disclosed and will also be forwarded to the Bank for further approval of compliance and disclosure at the Bank's Info Shop.

Environmental and Social Impacts

The proposed sub project investments in Kigoma- Ujiji Municipality under AF may have significant negative impacts on the environment from a project specific perspective. These impacts include:

i. Change of scenery view of the project areas
i. Air pollution caused by dust and air particulates dispersion during material excavation and transportation.
ii. Noise and vibration impacts
iii. Pollution of surface and ground water
iv. Increased waste generation at construction sites
v. Loss of definite materials and land degradation
vi. Interuption or lack of utility servives due to damage/relocation of existing utility infrastructure
vii. Lacking or slow restoration of areas impacted by construction
viii. Health and safety hazards of construction workers and general public
ix. Risks of ground and soil pollution by landfill leachate and,
x. Risks of air pollution by landfill gases

Impact assessment and evaluation was done using simple methods (checklists) and procedures (existing structures at local authorities). It is envisaged that the anticipated impacts from development of the infrastructure sub-projects in Kigoma - Ujiji Municipality will be short-term, site specific, confined, reversible and can be managed through the application of a set of mitigation and monitoring measures presented in the Environmental and Social Management Plan (ESMP).

The ESMP clearly indicates the institutional responsibilities with regard to implementing mitigation measures, monitoring of the implementation of these mitigation measures and related cost estimates and time horizons. Further, the ESIA has assessed the capacity of the Municipality to implement the proposed screening process and mitigation measures. The Municipality has previous experience with management of environmental and social issues related to construction/ civil works. The PO-RALG has the capacity and experience to do backstopping to the Municipality as need may arise.

However, the capacity of the Municipality is still at a nascent stage both to support and supervise construction work of the proposed infrastructure and, to implement the required environmental and social screening process described

above. Prevalent weaknesses are in the integration into the design before project commences and monitoring of the mitigation measures. The ESIA has made recommendations as appropriate, including training needs and cost estimates. It recommends building capacity at all levels through the provision of training to staff and decision makers who will be designated the role of planning, reviewing and implementing, and monitoring the construction of the different infrastructure and their auxiliary structures.

The role of the NEMC in the context of TSCP has been to provide technical assistance, approval of project as relevant and being a facilitator for the training program.

LIST OF ACRONYMS

BATNEEC - Best Available Technology Not Entailing Excess Cost
CBO - Community Based Organization
COBET - Complementary Basic Education in Tanzania
DoE - Department of Environment
EIA - Environmental Impact Assessment
EMA - Environnemental Management Act
ESIA - Environmental and Social Impact Assessment
ESMF - Environmental and Social Management Framework
ESMP - Environmental and Social Management Plan
EIS - Environnemental Impact Statement
EMA - Environmental Management Act
EWURA - Energy and Water Utilization Regulatory Authority
HIV/AIDS - Human Immune deficiency Virus /Acquired Immune Deficiency Syndrome
IDA - International Development Association
ICBAE - Integrated Community Based Adult Education Program
KUWASA - Kigoma Urban Water Supply and Sewerage Authority
LGSP - Local Government Support Project
NEP - National Environmental Plan
NEMC - National Environnemental Management
NGO - Non Governmental Organization
NSGRP - The National Strategy for Growth and Reduction of Poverty
PMO-RALG - Prime Minister's Office, Regional Administration and Local Government
PO-RALG - Presidents Office- Regional Administration and Local Government
STD - Sexual Transmitted Diseases
TAC - Technical Advisory Committee
TANESCO - Tanzania Electricity Supply Company
TTCL - Tanzania Telecommunication Company Ltd
ToR - Terms of References
TSCP - Tanzania Strategic Cities Project
WB - World Bank

ACKNOWLEDGEMENT

The preparation of this report was guided by the Environmental and Social Management Framework (ESMF) for the Proposed TSCP – AF Project of 2014. The report builds on a previous document titled "Environmental and Social Impact Assessment for the Investment Sub-Projects in Kigoma – Ujiji Municipality, under the Proposed Tanzania Strategic Cities Project" of January 2010. This current report is a review of the previous ESIA report.

This report is a result of cooperative efforts of a number of experts some of whom are listed in the study team. The projects proponent (PO-RALG) is indebted to all those who spared their precious time to contribute to the preparations of this report. A number of stakeholdesr and/or specialists were involved, a few are mentioned here.
The consultant wish to thank Eng. J. B. Bujulu and Dr. mukuki Hante of PO-RALG for a thorough technical guidance during the preparation of this report and the Management of the UWP Consulting (Tz) Ltd for awarding the team the consultancy which has yielded to this ESIA report.
Further, the consultant wishes to thank the Kigoma –Ujiji Municipal Authority for their cordial cooperation and for providing technical information and documents without which this report would have not been completed.

The consultant is gratefull to all stakeholders interviewed during the scoping and full ESIA exercise, including the Ward and Mtaa leaders at the specific project sites. In an earnest manner, we also thank all other individuals who assisted in one way or another during the preparation of this report.

Last but not least, the proponent and the consultant wishes to extend a sincere commendation to the World Bank for funding this the ESIA activity.

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1.0 INTRODUCTION

1.1 Background of Tanzania Strategic Cities Project (TSCP)

The Government of Tanzania (GoT) through the Prime Minister's Office, Regional Administration and Local Government (PMO-RALG) now known as Presidents Office Regional Administration and Local Government (PO-RALG)has received funds from the World Bank (IDA Credit) and a grant from the Government of the Kingdom of Denmark to implement the Tanzania Strategic Cities Project (TSCP). PO-RALG has been implementing the TSCP for more than 5 years since 2010. TSCP is an investment operation that provides finance for critical infrastructure in 4 cities of Mwanza, Tanga, Mbeya and Arusha; 4 municipalities of Ilemela, Dodoma, Kigoma-Ujiji, Mtwara-Mikindani and the Capital Development Authority (CDA).

- ***Current Status: completed and on-going works***

Activities under the Core Urban Infrastructure and Services component have involved improvement or development of selected infrastructure sub-projects at various locations in Kigoma - Ujiji. Works have involved upgrading /rehabilitation of a number of arterial roads and drainage and associated structures aimed at improving the movement of people, goods and services in the municipality. Priority is given to roads to enhance connectivity (linking principal residential areas, commercial centres and service centres) to the main road networks, enhancement of traffic flow. Completed sub-projects also include one main bus stand and two mini-bus stands as well as improved solid waste disposal facility, that is, construction of a landfill. Most of the infrastructure on the list of the first batch of prioritized sub-projects are complete and in use or in final stages of completion (90% complete).

- ***Rationale for TSCP Additional Financing***

Some areas of the completed infrastructure have been identified where further improvements need to be made. A number of infrastructure facilities were prioritized during the Core TSCP design and preparation, but not, financed under the first round of implementation due to cost estimates being far above the available funds under the credit. Thus, GoT through PO-RALG has decided to apply for a credit that will finance improvement of these facilities.

1.2 Rationale of the ESIA Study

The ESIA in the urban infrastructure and services component of Core TSCP in Kigoma - Ujiji was conducted and approved by the National Environment Management Council (NEMC) in 2010 and the Municipality was awarded an Environmental Certificate No. **EC/EIS/257.** Since the additional sub-projects were

earlier subjected to the ESIA study by then, this study accordingly provides a further update specific to the additional sub-projects. The environmental and social assessment and management process for the Kigoma - Ujiji Municipality responds to the World Bank Safeguards Policies and to requirements specified in the Tanzania EIA and Audit Regulations, 2005 (Part IX, Regulation 42, Sub-regulation (1); (2)(b); and (4)) on approval of changes to a project with a valid EIA Certificate.

The World Bank Safeguard Policies require that, before a project is appraised, relevant safeguards instruments, such as an Environmental and Social Impact Assessment (ESIA) containing an Environmental Management Plan (ESMP), or just an ESMP, and if the project requires it, a Resettlement Action Plan (RAP), will be locally prepared and disclosed and along that course will be forwarded to the Bank for disclosure at the Bank's Info Shop.

Notably, this ESIA has found-out that there will be **no resettlement at the additional sub-projects sites**. Works will be aligned within infrastructure Right of Way (RoW) or reserve, and zone designated for public utilities. Thus, a Resettlement Action Plan (**RAP) will not be prepared for the proposed additional works.** The design team will avoid interference with properties within and around project sites. The municipality will collaborate with the communities, supervision consultant and the contractors to resolve any unforeseen grievances on the basis of existing regulations. It should be noted that it is likely to have a minimal impact of the Road project to the annex structure of the mosque and therefore the Mosque Community was consulted in July 2016 and accepted the project and commented that their preference would be in-kind compensation mainly for the authority to rehabilitate the part that will be affected. It was also suggested that the design of the rehabilitation should be communicated to the mosque and agreed prior to implementation

1.3 Scope of Work

The indicative scope of works for the Kigoma – Ujiji Municipal Council is as follows:

(i) Construction of One Additional Cell at Msimba Landfill

This sub-project involves construction of an additional new cell at the landfill and carrying out necessary improvements to the recently constructed cell.

(ii) Extension/Improvements to Storm water drains at Lubengera and NHC Katubuka

This sub-project involves extending the newly improved storm water drains to discharge point.

(iii) Improvements to Bus Stand

Activities at this sub-project comprise additional work to be carried out at this recently completed facility in order to improve its *function ability* and to make the stand to be more suitable for effective use.

(i) Rusimbi Road upgrading (1.10km)

Complete upgrading measures of the road from its current gravel/potholed pavement to asphalt paved road.

1.4 Institutional Set-Up

PMO-RALG will be responsible for ensuring that the requirements of this ESIA are duly implemented. Notably, the necessary approvals required by the law, involving the responsible Authorities namely: the Vice President's Office (Division of Environment and the National Environment Management Council (NEMC).

1.5 Approach and Methodology for development of ESIA

1.5.1 The Approach

The following approach was used in the development of the ESIA.

- Identification of key issues for the ESIA study,
- Conduction of Scoping exercise which involved collection of data and information from literature, consultations with key informants and observations at representative LGAs to determine:
    - Baseline conditions of important biophysical and socio-economic receptors emphasizing prevalent trends and indicators;
    - Components of the TSCP sub-projects and activities in general likely to interact with this baseline;
    - Potential resulting environmental and social impacts;
    - Best alternative approaches for designing and implementing TSCP sub-projects;
    - Individual and institutional capacity building needs for implementation ESMP
- Developing the ESIA based on content specifically specified in the TOR.

1.5.2 Methodology

Field Studies and Public Consultation

Broader consultation: The fieldwork for this study was carried out in November 2014. The fieldwork involved reconnaissance to all sub-projects making various

observations, site visits and interviews with stakeholders as well as meeting relevant Kigoma-Ujiji Municipality officials.

The field visits were essential to fully realize the scope of the project, the biophysical environment specific to the location and the socio-economic conditions in the project area. The information was collected from various sources including Kigoma – Ujiji Municipal Council, Kigoma Urban Water Supply and Sewerage Authority (KUWASA), TANESCO, Lake Tanganyika Basin Water Board (LTBWB). Others included meeting with local community in Kigoma- Ujiji.
Information and data collected include land use, ecosystems and human habitat, demography, hydrology, and other indicators related to environmental and socio-economic trends of the project area. Other information was appraised through key informants interviews and experts' observations.

Public participation was considered as an important element of the process. In these EIA and SIA studies, various stakeholders participated. Broad consultations that involved local communities, Wards and key municipal officials were carried out. During these consultations, the local communities had opportunities to air their concerns. The concerns of each group have been addressed in Chapter 5 of this Environmental and Social Impact Assessment Report. The following methods were used during field studies to ensure effective public involvement;

- *Focus Group Discussions*: These discussions were held with specific and targeted groups in the society including women, youths and small business entrepreneurs, village leaders and environmental committees. Guiding questions or checklists were prepared to facilitate the discussions and to focus it on issues related to a particular group. Dynamics of focus group discussions were observed to ensure fruitful discussions under the leadership of the sociologist. The names of participants in the discussions are attached in Appendix II.
- *Meetings with Government Authorities*: Brief meetings were held with heads of various departments of Kigoma - Ujiji Municipal Council, ward leaders and beneficiaries of the subprojects. Meetings with authorities were held in their offices and involved few technical people.
- *Further stakeholders consultation was conducted in July 2016 where stakeholders were further informed about the benefits of the projects, grievance mechanism, impacts both positive and negative associated with the project and mechanisms to enhance or mitigate such impacts.*
- *Direct observations:* Some facts were observed directly by the ESIA team. The information obtained from this technique assisted the study team to have the starting point during subsequent one-to-one interviews with stakeholders.
- *Secondary information*: This information was obtained from existing reports including:

- The World Bank Safeguards Procedures and Operational Policy 4.01 on Environmental Assessment
- Kigoma Municipality Social economic Profile (2008) and
- Kigoma Municipality Environmental Profile (2008)

Impact Assessment

Impacts identification was done by superimposing the project elements onto the existing social and environmental natural using checklists. An environmental impact matrix method was used to identify impacts of major concern. A key guiding assumption in this study is that the project will be designed, constructed, operated and maintained with due care for safety and environmental matters using current and practical engineering practice and/or Best Available Technology Not Entailing Excess Cost (BATNEEC). The implementation schedule of the mitigation measures is summarized in the Environmental and Social Management Plan (ESMP).
The environmental assessment has been undertaken in close interaction with the engineering planning and design team of UWP Consulting. In this process environmental impacts have been evaluated for various alternatives. Several project alternatives were considered including that of not implementing the project. The fundamental environmental protection strategy and environmental considerations influencing engineering design were incorporated. However, reasonable regard to technological feasibility and economic capability were taken into account. *Inter alia*, the assessment entailed the following:

Collection of Baseline Data

The collection of baseline data was conducted subsequent to defining the scope of the ESIA. These data allows the study team to determine whether more detailed information on environmental conditions at the development site and its surroundings are needed and where such information can be obtained.
The sample of the study consisted mainly of ward division executives, committee members and the members of the general public who were considered to be potential affected persons and/or interested parties. All respondents were selected through convenient sampling techniques.

Both primary and secondary data were collected. Primary data were collected by observations and using semi-structured interviews with respective and targeted parties (as explained in the previous section). Secondary data were obtained from various relevant sources of information such as municipal profiles, wards, education and health reports and many other official and non-official documents.

Review of Policies, Legal and Institutional Framework for Environmental Management

This allowed the study team to update and enhance their understanding of national policies, legislation and institutional arrangements for environmental management in Tanzania and relevant international procedures to ascertain the optimal management of impacts.

Identifying Environmental Impacts

This was undertaken by compiling a contender list of key impacts such as loss of flora and fauna, settlement patterns, social and cultural systems, water resources, land tenure systems, etc;

Predicting Environmental Impacts

The environmental impacts were identified and their potential size and nature were predicted. The prediction of impacts specified the impact's causes and effects and its secondary and tertiary consequences to the environment and the local community was assessed.

Determining the Significance of Impacts

The key activity was to evaluate the significance of impacts, that is, judgments were made about which impacts found in the study area were considered important and therefore need to be mitigated.

Identifying Mitigation and Management Options

The options for dealing with identified and predicted impacts were considered. This enabled the study team to analyze proposed mitigation measures. A wide range of measures have been proposed to prevent, reduce, remedy or compensate for each of the adverse impacts evaluated as being significant. Analysis of the implications of adopting different alternatives was done to assist in clear decision-making.

1.6 Layout of ESIA Report

This report is divided into Eleven (11) chapters as described hereunder:

Chapter 1: Introduction

Provides the general overview of the project including how the project background and justification, objectives and scope of the study and methodology used for conducting the study.

Chapter 2: Project Description

This chapter details the project components and further outlines activities and materials used in all phases of the project i.e. (mobilization, construction and operation and decommissioning).

Chapter 3: Legal Requirement and Institutional Framework

It gives an overview of Environmental and Social Management Requirements describing the United Republic of Tanzania policy, legislative and institutional framework and applicable World Bank safeguard policies.

Chapter 4: Baseline Environmental and Social Conditions
The first part of this chapter elaborates the project influence area and boundaries. Subsequently the chapter outlines the baseline / existing conditions of the study area divided into physical environment, biological environment and socio-cultural environment.

Chapter 5: Stakeholders Identification and Analysis
Chapter five explains how the stakeholders were involved during the ESIA process and presents their views regarding the project.

Chapter 6: Identification and Analysis of Impacts
This chapter discusses environmental and social impacts associated with the project analysed according to impacts significance.

Chapter 7: Impact Mitigation Measures
Mitigation measures are summarized in response to the adverse impacts identified in chapter 6 of the report.

Chapter 8: Environmental & Social Management Plan
The Environmental and Social Management Plan (ESMP) presents how the identified impacts during design, construction and operation phases of the project will be managed avoid, minimise or offset any adverse significant biophysical and socio-economic effects of the proposed development.

Chapter 9: Environmental and Social Monitoring Plan
Environmental and Social Monitoring Plan elaborates how the implementation of the ESMP will be monitored throughout the phases of the project. It is a plan to monitor the efficiency of the proposed project mitigation measures.

Chapter 10: Decommissioning and Demobilisation
This chapter presents the activities involved when the proposed project is no longer operational and potential impacts to be managed.

Chapter 11: Conclusions and Recommendations
Summary and conclusion summarizes findings with regards to how feasible, viable and environmentally acceptable the project is and provides recommendations to the proponent on the feasibility of the project.

Further, the report will also provide a list of documents used in a reference list and also a list of Appendices.

2.0 PROJECT DESCRIPTION

2.1 Project Location

Kigoma-Ujiji Municipality (MC) is the headquarters of Kigoma District and Kigoma Region, respectively. The Municipality is located at the North Eastern shore of Lake Tanganyika at 90ºS and 90ºE in Western Tanzania (Figure 2.1). The distance from Dar es Salaam to Kigoma Municipality is 1500 km. To the west the Municipality boarders the Democratic Republic of Congo (DRC) and to the South, East and North it boarders the Kigoma Rural District. Figure 2.2 shows the Kigoma Municipality and project roads.

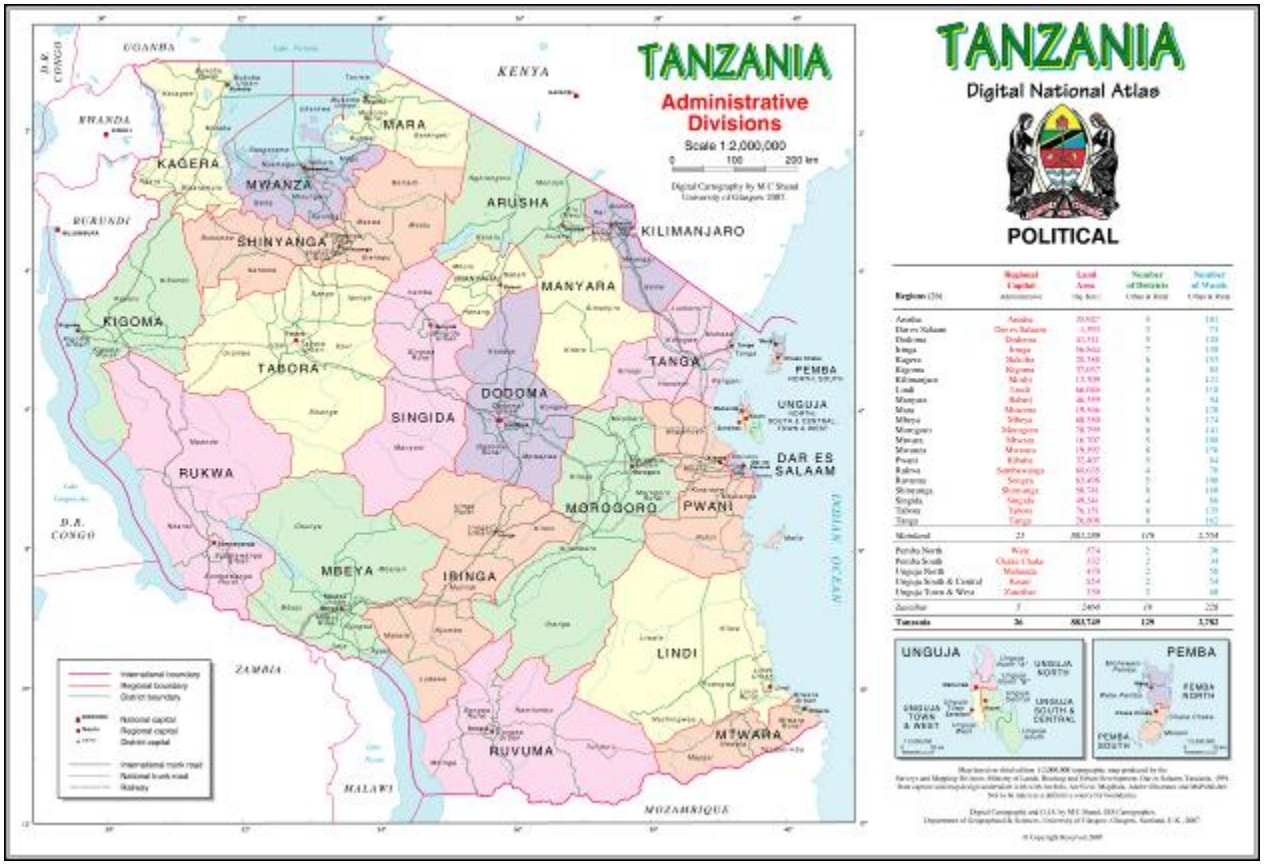
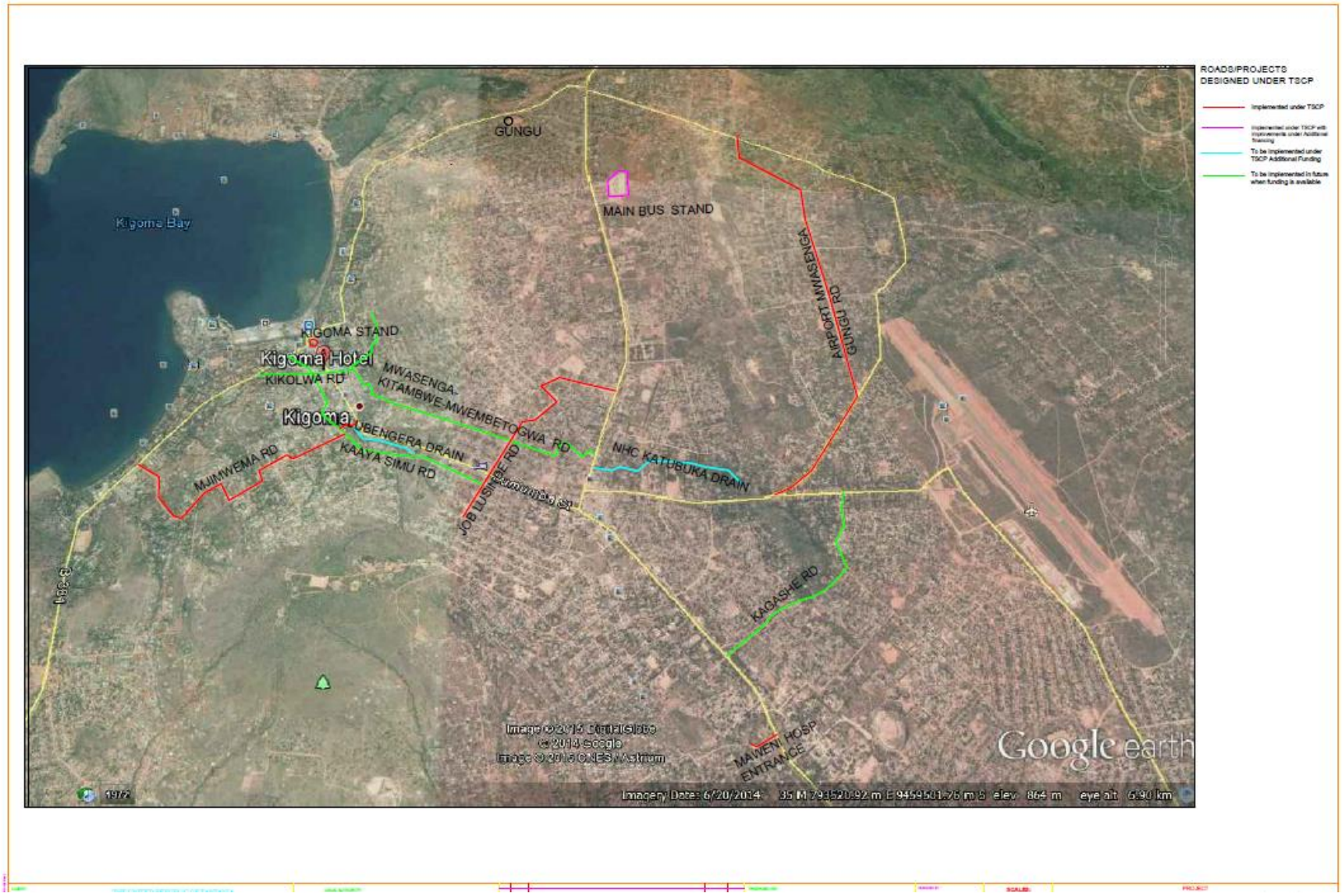


Figure 2.1: Map of Tanzania showing project area.


ROADS/PROJECTS
DESIGNED UNDER TSCP
Implemented under TSCP
To be implemented under
TSCP Additional Funding
To be implemented in future
when funding is available
GUNGU
MAIN BUS STAND
Kigoma Bay
KIGOMA STAND
Kigoma Hotel
KIKOLWA RD
MWASENGA-
KITAMBWE-MWEMBETOGWA RD
Kigoma
TUBENGERA DRAIN
KAAYA SIMU RD
MUINTWEMA RD
JOB LUSINDE RD
NHC KATUBUKA DRAIN
AIRPORT MWASENGA
GUNGU RD
KAGASHE RD
MAWENI HOSP
ENTRANCE
Google earth
Imagery Date: 6/20/2014


ROADS/PROJECTS
DESIGNED UNDER TSCP
Implemented under TSCP
Implemented under TSCP with improvements under Additional financing
To be implemented under TSCP Additional Funding
To be implemented in future when funding is available
RISUMBE RD
UJIJI BUS STAND
KATONYAGA DRAIN
WAFIPA - KAGERA RD
RUSIMBI RD
Image © 2015 DigitalGlobe
© 2014 Google
Google earth

Figure 2.2: *Satellite image showing the Kigoma Municipality and Project roads*

2.2 Project Components

The proposed TSCP AF in Kigoma - Ujiji has four components as described below:

i. Rusimbi Road upgrading (1.10km)

Complete upgrading measures of the road from its current gravel/potholed pavement to asphalt paved road with

- Paved storm water drains
- Installation of culverts where required
- Lanes for pedestrians segregated from the vehicular lanes
- New pavement layers comprising
    - 30mm AC 14 on
    - 150mm CRR on
    - 200mm CM cement stabilised Sub-base on
    - Improved sub-grade layers
- Installation of Street Lights

ii. Extension/Improvements to Storm water drains at Lubengera and NHC Katubuka

This sub-project involves extending the newly improved storm water drains to discharge point. Activities include

- Construction of masonry Erosion Checks/Check-dams at suitable spacing to in order to create mild stable bed slopes
- Contraction of masonry work or stone-pitched protection works where necessary to protect banks from collapse
- Construction of stone-pitched channels at culvert end structures and at the edge of road embankment

iii. Improvements to Bus Stand

Activities at this sub-project comprise additional work to be carried out at this recently completed facility in order to improve its functionability and to make the stand to be more suitable for effective use. The additional works include

- Construction of Block-work Perimeter wall
- Construction of Ticketing Offices along the fence wall

iv. Construction of One Additional Cell at Msimba Landfill

This sub-project involves construction of an additional new cell at the landfill and carrying out necessary improvements to the recently constructed cell. Activities include

- Construction according to design an additional new cell
- Construction of drainage systems to collect leachate and storm water to respective storage ponds
- Addressing shortfalls identified in the recently constructed cell. These include
    - Identification of source of cover material protection
    - Providing revised Landfill Site Development and Operational Plan

- Providing Site Operation and Maintenance Framework

All the project roads will retain the existing horizontal profile. Extension of the drainage channel in Kigoma-Ujiji will also follow the existing alignment. The new landfill cell will be constructed on the existing site, adjacent the newly constructed cell.

2.2.1 Sub-projects alternatives

In the course of developing the proposed sub-projects for road, storm drain, street light and landfill structures, alternatives were compared in terms of potential environmental and social impacts; capital and operating costs, land availability and; suitability under local conditions. It was imperative to also examine and review different sub-projects settings, designs, and construction alternatives where two options were considered: No sub-project option and, Alternative sites.

2.2.2 'No sub-project' option

The investment sub-projects for the municipality of Kigoma-Ujiji under the proposed TSCP - AF are expected to improve sanitation and public health, promote safe and efficient mobility in the towns, improved economy and the general well-being in the city setting.

With contemporary fast increase of the population in the city, the challenge still prevails of inadequate stock and quality road, drainage, street lighting and waste disposal infrastructure. However, the sustainability of those infrastructure facilities depends on the good operation and maintenance of the facilities that will be adopted by the municipal authority.

If the 'no project' option was chosen, from the economic standpoint and social considerations, the following benefits will be foregone: i) improved transportation; ii) long life span for roads, iii) employment; iv) low incidence of accidents and v) controlled flooding inside urban centres against water stagnation. vi) good visibility and security at night and whenever natural light is dim, and vii) improved environmental sanitation in the city. Hence, for TSCP – AF sub-projects, the alternative of "no-project" would increase the risks on traffic and pedestrian accidents, flood damages to houses, vandalism of the infrastructure, untidy environment and general poor public health.
Thus, the 'no sub-project' option will not be a viable alternative under TSCP – AF sub-projects in Kigoma-Ujiji Municipality.

2.3Project Activities in General

2.3.1 Mobilization phase

Activities

This phase entails mobilization of labour force, equipment and construction of project office and camp sites as well as acquisition of various permits(including water extraction rights)as required by the law. Other activities during this phase include carrying out of topographical survey, geo-technical investigation, soils and materials investigation, land acquisition, material storage and material preparation and identification sources of construction materials including and source of water. During this period, auxiliary and preliminary works such as crushing of aggregates, locating sign posts and identifying sites for disposal of wastes will be conducted.

Duration

The duration of this phase will be four (4) months.

Types and Sources of Project requirements

Types and sources of project requirements during the pre-construction are presented in this section: Materials investigations and characterization has been done by the project design team, focusing on, among other things: investigations of existing and potential new borrow pits and quarry site areas in order to obtain suitable materials for the construction of gravel pavement layers and for the manufacture of concrete and for crushed stone and surfacing materials respectively. Further, the team has identified sources of water and sand for construction works as shown in Table 2.1.

Table 2.1: Project requirements & sources during pre-construction phase

Requirements	Type	Source
Raw Materials	Gravel	Borrow pits at Bangwe 1 and 2, Pentecoste-Mnarani
	Hard Stone	Ilagala Chinese Quarry
	Sand	Kibirizi pit
	Water	Lake Tanganyika
	Cement	Tanga Cement Co. Ltd
	Reinforcement bars	Local Vendors in Kigoma Municipality
	Timber	Local vendorsKigoma Municipality
Energy	Electricity	TANESCO (National Grid)/ Generators
	Fuel	Local vending stations
Manpower	Skilled	Contractor
	Unskilled	Local People along the road
Equipments	Dump Trucks, Graders, Dozers, Water Boozers, Vibratorss, Excavators	Contractor

Source: Design report for Proposed Additional Sub-Projects in Kigoma-Ujiji Municipality under the TSCP, 2014

The types of waste which are likely to be generated during the mobilization phase are as shown in Table 2.2.

Table 2.2: Types, amounts and management of wastes during the mobilization

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Garbage: Food remains, cardboards and papers Plants including trees and grasses	29.4 kg/day (based on generation rate of 0.21 kg/day/ person and 140 workers)	Collected in a large skip bucket at the construction sites/office and campsite. then to be composted and used as manure.
Solid Waste (Non-Degradable)	Scrap metals and plastics	1 - 4 kg per day	Sold to Recyclers
	Tins and glasses	0.5 - 4 kg per day	Disposal at the new Authorised landfill at Msimba
Liquid waste	Sewage Sullage	4.48 m^3 (Based on 140 people, 40 l/capita/day water consumption and 80% becomes wastewater)	Disposed into Septic tank –Soakaway system at the campsites/ office
	Oils and greases	None	Car maintenance will be done at proper garages

Note: Estimation data used are typical waste generation rates in construction sites, based on the experience of the consultant.

Wastes such as top soils will be used to fill the diversions, while biomass such as felled trees will be used as a source of energy at the camp sites. Scrap metals will be sold for recycling purposes. Scrap metals, used oil and greases will be sold for recycling purposes. Car maintenance and repair should be done in proper garages.

2.3.2 Construction phase

The project is essentially civil works in nature mainly consisting of;

I. Rusimbi Road upgrading (1.10km)
Activities for this subproject will include:

- Filling and reshaping the road section to sub-grade level
- Cutting of the earth sections to facilitate widening of the roads
- Upgrading or construction of longitudinal and cross drainage structures
- Provision of sub-base, base course and double surface dressing ending with finishing course of bitumen surface standard.
- Demolition and removal of bridges, culverts and temporary bridges;
- Provision of temporary crossings and traffic diversions;
- Excavation of the existing roads and the construction of fill embankments;
- Shaping of gravel from borrow pits for sub-base and base;
- Supply of bitumen and stone chippings;

- Laying a bitumen prime coat and bituminous surface treatment;
- Excavation for the construction of the concrete bridges and incidental works;
- Construction of concrete bridges and incidental works

II. Extension/Improvements to Storm water drains at Lubengera and NHC Katubuka

Activities for this subproject will include:

- Site clearance;
- Levelling
- Upgrading or construction of longitudinal and cross drainage structures
- Provision of temporary crossings and traffic diversions (where required);
- Filling and reshaping and levelling trenches;
- Lining of the trenches;
- Finishing the surface.

III. Construction of One Additional Cell at Msimba Landfill

- Construction of dikes/bunds, surface run-on and run off drainage channels
- Lying down of liners
- Construction of leachate collection and retention systems
- Construction of landfill gas ventilation/ collection system
- Setting up of monitoring facilities for ground/ surface water, air and noise pollution
- Construction/ provision of fences, gate, office, weighbridge, water and power supplies, sanitation facilities, garage and workshop for heavy equipments and vehicles, cover soil, stockyard and other facilities

IV. Improvements to Bus Stand

- Excavation of trenches,
- Construction of Block-work Perimeter wall and,
- Construction of Ticketing Offices along the fence wall.

Types and Sources of Project requirements

Types and sources of project requirements during the construction phase are shown in Table 2.3:

Table 2.3: Project requirementsand Sources during the construction phase

Requirements	Type	Source
Raw Materials	Gravel	Bangwe 1&2 , Pentecoste Mnarani
	Hard Stone	Ilagala Chinese Quarry
	Sand	Kibinzi pit
	Water	KUWASA
	Bitumen	South Africa/Saudi Arabia
	Cement	Tanga Cement Co. Ltd
	Reinforcement bars	Local Vendors in Kigoma Municipality
Manpower	Skilled	• Contractor
	Unskilled	• Local People
Equipment	All construction machines and equipment	• Contractor

Requirements	Type	Source
	All type Vehicles and Trucks	• Contractor

Source: Design report for Proposed Additional Sub-Projects in Kigoma – Ujiji Municipality under the TSCP, 2014)

Typical waste types during this phase are listed in Table 2.4 together with the estimated amounts.

Table 2.4: Types, amounts and management of wastes generated during the construction phase

Waste	Types	Amount	Treatment/ Disposal
Solid Waste (Degradable)	Garbage: Food remains, cardboards and papers Plants (trees, grasses)	40 kg/day (based on generation rate of 0.2 kg/day/ person and 200 workers)	Disposal at the new authorised landfill at Msimba
Solid Waste (Non-Degradable)	Scrap metals	4 - 8 kg per day	Sorted and sold to recyclers
	Tins, glasses and plastics	2 - 4 kg per day	
Liquid waste	Sewage Sullage	6.4 m^3 (Based on 200 people, 40 l/capita/day water consumption and 80% becomes wastewater)	Disposed into Septic tank – Soak away system at the campsites/ office

Note: Estimation data used are typical waste generation rates in construction sites, based on the experience of the consultant.

Solid waste such as top soils will be used to fill the diversions, while plants such as felled trees will be used as a source of energy in the camp sites. Scrap metals will be sold for recycling purposes. Scrap metals, used oil and greases will be sold for recycling purposes. Car maintenance and repair should be done in proper garages.

2.3.3 Operation phase

The actual usage of the facilities is expected to commence after completion of the construction works. The project facilities in Kigoma-Ujiji will be directly managed by the Kigoma - Ujji Municipal Authority. During operational phase, the Municipal Council will carry out routine maintenance of the facilities including resurfacing of the roads, removal of debris from storm water channels, clearance of vegetation along the road, management of waste placement, compaction and covering of the waste in the landfill according to the landfill design.

The municipal authority will sub-contract the operation of the ticketing office to a private company. The company shall be responsible for the management of the ticketing office, under the supervision of the Council. However, the following activities will be performed during the operation phase:

Operational activities at the landfill

- Placement of the waste in cells, followed by levelling, waste covering and compacting of solid waste
- Extension/Construction of on-site roads
- Environmental monitoring of dust, noise, leachate, landfill gas, and groundwater quality.
- Monitoring performance of leachate ponds
- Control of soil erosion
- On/ Near site excavation / trenching of soil for cover material
- Estimate of traffic volume during the land-filling operation phase

Activities during operation of roads and drains

- Periodic maintanace of of the roads and drain
- Removal of solid waste and silt from the trenches

Acativities during the operational of the ticketing officers

- Issuing of tickets to passengers

Types, Amounts and treatment/disposal of Wastes

Types, amounts and treatment/disposal of wastes exepected to be generated during the operational phase are mainly waste disludged from storm drains during regular O&M of the drains, and paper wastes from the ticketing station to be constructed at the bus parking stands. These are shown in Table 2.5 as follows;

Table 2.5: Types, amounts and management of wastes during the operational

Waste	Types	Amount	Treatment/ Disposal
Mixed wastes deposited into storm water drains	Plastics, Paper, Silts and Grass	N/A	Collection and disposal in the new authorized waste dump at Msimba area
Solid waste	Used paper tickets from the ticketing station	N/A	Collection and disposal in the new authorized waste dump at Msimba

2.3.4 Decommissioning/Demobilization phase

Demobilization

Demobilization of temporary structures will be done for proper restoration of the site (e.g. removing/spreading top-soils piled along the road, restoration of borrow pits to required grades and removing all temporary structures). Depending on their design and status, campsites may be left to the local governments depending on agreements that will be reached during the mobilization phase.

Decommissioning

Decommissioning of roads, storm water drains, and bus stands is not anticipated in a foreseeable future as Tanzania still needs these facilities and cannot afford to abandon them. After the landfill closure there shall be adequate long term maintenance controls (control of landfill gasses and leachate) to protect the surrounding environment.
Decommissioning of landfill will happen at the end of the landfill design life i.e. 100 years. The activities in this phase will include;

- Application of the final cover
- Grading the final slopes to around 5%
- Installation of a permanent system of surface drainage channels on the landfill
- Disassemble temporary structure (e.g. camp site buildings)
- Seeding the final cover with the appropriate mixture of grasses.
- Regular inspection of
    - Settlement, cover soil integrity, and need for grading
    - Sedimentation and erosion control facilities
    - Leachate and gas control
    - Vandalism and squatting prevention measures
    - Vegetation
    - Fencing
    - Monitoring systems

Duration

Demobilization stage will last for a period of three (4) months

Types and Sources of Project requirements

Types and sources of project requirements during the demobilization phaseareshown in Table 2.6 as follows;

Table 2.6: Project requirements during the demobilization phase

Requirements	**Type**	**Source**
Manpower	Skilled	**Contractor**
	Unskilled	**Local People along the road**
Equipments	Bull dozer	**Contractor**
	Motor grader	**Contractor**
	Roller Compactor	**Contractor**
	Plate compactor	**Contractor**
	Tippers	**Contractor**

2.4 DESIGN CONSIDERATION

This section presents design concepts for each of the proposed projects. Engineering drawings for the facilities are presented in Appendix IV.

2.4.1 Design of Rusimbi Road

Following site visits to the project site by the project design team, the previously proposed geometric designs were adjusted where necessary to suit the practical present field conditions. Further refinement has led to the development of construction working drawings (Appendix IV) to be used in the bidding phase of the project. A summary of the design concepts is provided hereunder.

Design Speed: Rusimbi road is located in a predominantly built-up central business and suburban areas with clearly defined right of way (RoW) servitudes, thus, the choice of design speed is based on a "safe practical" approach that best fits within the RoW rather than an "ideal" approach. The adopted design speed for Rusimbi road is 40km/h.

Cross-Sections: Rusimbi road has been provided with two surfaced lanes, one for each direction, with the traffic lanes measuring 3.25m. No shoulder has been provided on the road. Open side drains have been provided on both sides on the cambered section and on one side on the single cross slope section.
Neither sidewalk nor cycle lane could be provided on this road due to limited space. Road verges, comprising of earth, gravel or paved surfacing depending on the adjacent environment and extending to the adjacent property boundaries shall be provided where space is available. RoW servitude width adopted is as defined by the cadastral boundary information passed on by the LGA's during the site visits.

Horizontal and Vertical Alignments: The proposed new horizontal alignments and curvature attempt to minimise the impact of new construction on the existing environment such as existing buildings, structures, monuments, trees etc.

Pedestrian and Cyclist Facilities: As described before, due to the nature of the project site, neither sidewalks nor cycle lanes have been provided for. Pedestrian and cyclist crossings will be provided at safe crossing zones comprising of painted road markings with adequate advance warning signage and traffic calming structures.

Storm water drains: The conveyance and accommodation of road prism storm water run-off generated from the upgraded road system has been provided for in the form of new side drains collecting and transporting run-off to new and/or existing inlet and outlet structures discharging into the existing storm water system. The following approved standards (Table 2.7) by the Ministry of Infrastructure Development (formerly the Ministry of Works – MoW) shall be adopted and adhered to:

Table 2.7: Adopted Design Standards

1.	**Geometric design**	**MoM Draft Design Manual of 1989, Code of practice for Geometric Design (Draft) published by SATTC –TU, 1998**
2.	Pavement and Materials	MoW Pavement and Materials Design Manual, 1999
3.	Specifications	MoW Standard Specifications for Road Works
4.	Testing Procedure	MoW Central Materials Laboratory testing Manual
5.	Structures	British Standards BS 5400
6.	Hydrology and Hydraulics	TRRL East African Flood Model
7.	Surveying	Land Survey and Mapping Standards of Tanzania (Land Surveying Regulations CAP 390)

2.4.4 Design of the Landfill

Access control:

The entire site is fenced with a gate entrance off the District Road which extends along the western boundary.

A small building comprising an office and ablution is provided. The access layout allow for the construction of a weigh bridge at future date.
Utility services are required. Water supply is provided from a site monitoring bore hole at the northern boundary of the site. The water is to be pumped into a 2k elevated header tan which is connected to the building. Sewage disposal is via septic tank French drain.

Waste Cells; The proposed air space volume is $1.0x10^6$ $m^{3.}$

The proposed waste disposal area covers 330x240m ($79376m^2$) with the depth of waste being build up to approximately 12m. As it is not feasible financially or technically to construct the entire site initially, the development of the site has been divided into cells approximately 50m wide. It will not be possible to fill each cell to it is full eight untitled adjacent cells are constructive; however the life of cell is approximately 2 years. An estimated daily tonnage of 150 tonnages has been used.

The cell as designed such as based is excavating into the in-situ soils. It is proposed that the soil excavating from cell one shall be stock piled in the south excavating Cell 2. This would continue for subsequent cells with the Cell 1 material being used for cover for Cell 6.

Liner System: As the volume of clay suitable for use as the liner is uncertain the primary liner incorporates a Geo-synthetic Clay Liner (GCL) in place of compacted clay. The GCL is covered by a protection layer 150 mm thick comprising material

from site and is supported on a based layer 100mm think also comprising material from site. This layers under lain by 150mm stone cheaper charted tectionliyeranda150mm compacted clay secondary liner.

During the construction of subsequent cells, it is essential that the liner layers are tied into the previous constructive liner layers. Along the side slopes the leachate detection and secondary liner layers are omitted.

Leachate drainage: Leachate is generated by the liquids in the waste, the decomposition of waster and rain falling on to the waste. To restrict the volume of leachate, all storm water from adjacent areas is to be diverted away from the waste body. In addition the uncapped areas of waster shall be kept to a minimum and progressive closer of portions of the site shall be under taken as soon as final levels are attained. The primary leachate drainage system is a 150mm stone chip layer above the liner assist drainage 150mm diameter slotted peppers are provided daylong the centre of each cell. The leachate is intercepted at the southern edge of the land fill and piped to a leachate pond located at the south-western corner of the site.

It is difficult to predict the volumes of leachate that will be produced as rain affects the flow. Soon after construction of a landfill cell, run off from the lined area is high. As waste covers the cell it attenuates the run off reducing peak flow. Data available reveals the Mean Annual Rainfall is 1200mm, the average daily rainfalls 94mm, whilst the maximum daily rainfall is recorded at 117mm. The leachate pond provides storage of 750mm3. The pond is provided with an over flow into the contaminated storm water storage pond. The leachate pond is lined with 2.0m thick HDPE geo-membrane.

2.5 Construction Materials and Labour Force

Essential construction materials include graves, stones, aggregates, sand, iron bars, water, bitumen, landfill liners, leachate collection pipes and landfill gas vents. All materials are available in the project area (Table 2.8) except bitumen and landfill liners, which will be imported by the contractor. Gravels will be obtained from the existing borrow pits (Figure 2.3) though more may have to be opened up during the construction stage if the need will arise.

Table 2.8: Potential material sources

Material	Source	Estimated quantities (m^3)	Type	Comment
Water	Lake Tanganyika	Abundant		Existing
Gravel	Bangwe	70,000	Reddish Lateritic gravels	Existing
	Bangwe 2	65,000	Reddish Lateritic gravels	Existing
	Katonga	50,000	Reddish Lateritic gravels	Existing

Material	**Source**	**Estimated quantities (m^3)**	**Type**	**Comment**
Hard rock	Ilagala Chinese quarry	50,000	Granodiorite	Existing
	Stone deposits	15,000	Granite	Existing
Sand	Kibirizi Pits	Abundant	Quartize	Existing

Figure 2.3: Kibirizi Sandpit (left) and Bangwe gravel; source site (right)

Construction works is generally a labour intensive undertaking. Apart from technical and skilled manpower, recruitment of unskilled labour will be done locally. A minimum of 200 people are expected to be employed by these projects.

2.6 Camp Site Location

The location of the campsite(s) has not been identified. The developer shall discuss and agree with the contractor on proper location of the camp site, in agreement with the local community. Due to the nature of the projects in Kigoma-Ujiji, the consultant predicts that only the dumpsite project will need a campsite. This being the case, a camp can possibly be located at the dumpsite area. Management of all types of wastes from the camp will be by the existing facilities i.e. toilets, waste bins etc.

If it turns out that the remaining subprojects need a campsite, the contractor shall rent land from the community. The developer will make sure that all legal issues are considered in order to have mutual benefits.

2.7 Waste Generation

Waste generated during all the project phases shall be handled in an environmentally friendly manner. Spoil soil shall be stock piled along the road alignment or at the borrow pits. The soils shall be used to reinstatement of sites at the end of the project implementation phase. Domestic wastes generated at the campsites and offices shall be disposed in VIP latrines connected to septic tank/soak away systems. Solid wastes shall be stored in waste bins at the sites/campsite, and later transported to designated disposal sites. Other contingent plans to handle the accidental oil spillages and general waste management shall be worked out during the preparation of ESMP for this project

3.0 LEGAL REQUIREMENTS AND INSTITUTIONAL FRAMEWORK

3.1 World Bank Safeguard Policies

The World Bank Safeguard Policies are Operational Policies (OP) and Bank Procedures (BP) approved by the Board for addressing environmental and social issues within the Banks supported development projects. TSCP has been assigned Environmental Risk Assessment Category B and triggers the following World Bank Safeguard Polices: (i) Environmental Assessment (OP/BP 4.01); (ii) Involuntary Resettlement Policy (OP/BP 4.12); (iii) Physical Cultural Resources (OP/BP 4.11). The same policies will apply to the Sub-Project activities under the proposed Additional Financing.
The safeguard policies considered applicable to the TSCP in general and Additional Financing specifically are:

3.1.2 OP 4.01 (Environmental Assessment)

The World Bank's safeguard policy OP 4.01 Environmental Assessment requires that all Bank-financed operations are screened for potential environmental and social impacts a view shared by the Tanzania National ESIA procedures and processes. Both policies emphasize that the required environmental assessment be carried out on the basis of the screening results.
In Kigoma- Ujiji, the Additional Financing intends to cater for a variety of infrastructure including arterial urban roads and associated storm water drains, drainage channels from urban facilities and a landfill and, these can have adverse environmental impacts. In this ESIA these potential impacts are well described. The ESIA contains directions for the Municipality project teams and local leaders and management committees on practical ways of avoiding or mitigating adverse impacts. An ESMP is also included in this ESIA report.

3.1.3 OP/BP4.11 (Physical Cultural Resources)

Culturally, Tanzania is an extremely rich and diverse country and is home to ancient civilizations: 300-year-old Arab settlements; 100–year-old European buildings; graveyards; sacred areas; mosques; churches; etc. To mitigate potential adverse impacts on cultural property, training of LGA project teams and local leaders and management committees and the subproject planning checklist as well as other tools, will ensure that cultural property resources are identified during subproject planning, and appropriate measures are taken to avoid damaging them. Chance find procedures have been included into civil works contracts; Designs and buffer zones will be created to avoid damage to cultural resources, such as "sacred" forests and graveyards. According to approved designs, the proposed infrastructure (additional landfill cell, the Rusimbi road, Katubuka and Lubengera drains and the

bus stand) in Kigoma- Ujiji) are such that they do not affect cultural resources, but procedures in case of "chance finds" will be observed.

3.1.4 OP 4.12 (Involuntary Resettlement)

WB Involuntary Resettlement Policy OP 4.12 requires that all projects with land acquisition implications are guided by a Resettlement Policy Framework (RPF), which outlines processes and procedures to be followed for preparation of site specific RAPs during project implementation.. However, in Tanzania, there are no explicit requirements for a RPF or RAP. As regards compensation the Tanzania laws requires that only the rightful land or property owner (statutory or customary rights of occupancy) should be compensated, while the WB OP 4.12 require that any person (whether is rightful owner or not) who lose or is denied or restricted access to economic resources – including tenants, encroachers, squatters - should either be compensated for use of the land or assisted to move. TSCP project will apply both WB requirements and Tanzania government's guidelines regarding compensation and resettlement of Project Affected People (PAP, and where there are gaps between these two the World Bank's safeguard policy will prevail.
Selected sub-projects in Kigoma -Ujiji involve rehabilitation/improvements of existing infrastructure at/along their original location. There will be no land take or resettlement of people at any of the four project sites and thus no involuntary resettlement has been considered.

3.2 Relevant National Policies and Environmental and Social Management Requirements

A clean and safe environment is the constitutional right of every Tanzanian citizen. Regulation on environmental management in the country is mainly vested on two public institutions, the NEMC and the Division of Environment (DoE) in the office of the Vice President. NEMC undertakes enforcement, compliance, and review of environmental impact statements whereas the DoE provides the policy formulations and technical back-up and executes the overall mandate for environmental management in the country. The EIA certificate is issued by the Minister responsible for Environment. There are many policies and pieces of legislation on environmental management in Tanzania, the relevant ones to this project area briefly discussed below.

National Policies

Environmental awareness in the country has significantly increased in recent years. The government has been developing and reviewing national policies to address environmental management in various sectors. Among others, the

objective of these policies is to regulate the development undertaken within respective sectors so that they are not undertaken at the expense of the environment. The National Policies that address environmental management as far as the proposed projects are concerned and which form the cornerstone of the present study include *inter alia*.

3.2.1 General Environmental Management

National Environmental Policy (NEP) of 1997

Tanzania currently aims to achieve sustainable development through the rational and sustainable use of natural resources and to incorporate measures that safeguard the environment in any development activities. The environmental policy document seeks to provide the framework for making the fundamental changes that are needed to bring consideration of the environment into the mainstream of the decision making processes in the country.

The National Environmental Policy, 1997 stresses that for a framework law to be effective, environmental standards and procedures have to be in place. For example, Chapter 4 of the policy (Instruments for Environmental; Policy), Section 61, states that "*As part of the (National Environmental Policy) strategy in the implementation of the National Environmental Guidelines, specific criteria for EIA conduct will be formulated*".

The National Environmental Policy as a national framework for environmental management emphasizes that the transport sector shall focus on the following environmental objectives:

- Ensuring sustainability, security and the equitable use of resources for meeting the basic needs of the present and future generations without degrading the environment or risking health or safety;
- To prevent and control degradation of land, water, vegetation and air which constitute our life support system;
- To conserve and enhance our natural and man-made heritage, including the biological diversity of the unique ecosystem of Tanzania;
- To improve the condition and productivity of degraded areas including rural and urban settlement in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings;
- To raise public awareness and understanding of the essential linkages between environment and development and to promote individual and community participation in the environmental action and;
- To promote international co-operation on the environment and expand our participation and contribution to relevant bilateral, sub-regional, regional, and global organizations and programs, including implementation of treaties

Critically, the National Environmental Policy emphasize the following aspects of natural resources management taking into account that the project proposal has impacts on natural resources:

- Wildlife resources should be protected and utilized in a sustainable manner; and on the basis of careful assessment of natural heritage in flora and fauna, fragile ecosystem, site under pressure and endangered species, with participation of, and benefits to, the local communities. Environmentally adverse impacts of development project in wildlife conservation area e.g. (tourist hotels, road construction) will be minimized by Environmental Impact Assessment studies and;
- It encourages the development of sustainable regimes for soil conservation and forest protection, taking into consideration the links between desertification, deforestation, freshwater availability, climatic change and biological diversity.

On addressing the issues of poverty alleviation, the policy recognizes its impact to the environment. The policy focuses on the satisfaction of basic needs of citizens with due cognizance to protecting the environment. This project will ensure that the above policy objectives are met.
The NEP advocates the adoption of Environmental Impact Assessment (EIA) as a tool for screening development projects which are likely to cause adverse environmental impacts.

Environmental Management Act No. 20 of (2004), Cap. 191

The Environmental Management Act (EMA) is a piece of legislation that forms an umbrella law on environmental management in Tanzania. Its enactment has repealed the National Environment Management Council Act. 19 of (1983) while providing for the continued existence of the National Environment Management Council (NEMC).

Among the major purposes of the EMA are to provide the legal and institutional framework for sustainable management of the environment in Tanzania; to outline principles for management, impact and risk assessment, the prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide the basis for implementation of international instruments on the environment; to provide for implementation of the National Environmental Policy; to provide for establishment of the National Environmental Fund and to provide for other related matters.

Part III, Section 15(a) states that in matters pertaining to the environment, the Director of Environment shall coordinate various environment management activities being undertaken by other agencies to promote the integration of environment considerations into development policies, plans, programmes, strategies projects and undertake strategic environmental assessments with a view to ensuring the proper management and rational utilization of environmental

resources on a sustainable basis for the improvement of the quality of human life in Tanzania.

Environmental Impact and Auditing Regulations (2005)
These regulations set procedures for conducting ESIA and environmental audit in the country. The regulations are made from Section 82 and 230 of the EMA (2004) and prescribe that the Minister responsible for environment shall formulate regulations and guidelines on how ESIA shall be conducted. The ESIA regulations are applicable to all project contained in Third Schedule of the EMA (2004) and First Schedule of the ESIA and Audit Regulations. These Regulations prescribes the stages and/or the ESIA process, which are in principle managed by the NEMC.

Environmental (Registration of Environmental Experts) Regulations (2005)

The law requires ESIAs be conducted by a person or firm of experts registered and certified by the Registrar at NEMC. PMO-RALG has consulted fully registered EIA experts undertake this ESIA. Kigoma - Ujiji Municipal Authority has assigned qualified external experts with the support of PO- RALG staff to work on the ESIA to a point where the sub-projects will be granted an ESIA certificate issued by Minister responsible for environment.

3.2.2 Management of Air Emissions and Ambient Air Quality

Environmental Management Act (EMA), Cap 191 (Sections 74, 75, 130-132)
EMA has provisions for three main areas: General Atmosphere; Climate Change and Management of Gaseous Wastes from Various Sources. The Act directs project proponents to adopt national standards on air emissions.

Environmental Management (Air Quality Standards) Regulations, (2007)
This regulation prohibits emissions/release of hazardous substance into the environment. The sub-project ESMP for managing wastes will adhere to permissible emission limits and quantities of emissions of SOX, CO, black smoke and suspended particulate matters, NOX, O_3, hydrocarbon, dust, lead and substances in exhaust of motor vehicles prescribed by the regulations. If need be, Kigoma Municipality shall seek air pollutant emission permit issued by NEMC.

Public Health Act, Cap 336 (2009)
The Act sets requirements for management of gaseous wastes from various sources including vehicles. The sub-project ESMP will ensure that habitable buildings under TSCP are designed to have adequate openings or ventilation, means of smoke escape, and maintenance of equipment and devices.

Occupational Health and Safety Act, No.5 (2003)

The sub-projects ESMP for Kigoma – Ujiji Municipality has incorporate requirements and standards for personnel working in areas where dangerous fumes are likely to be present; and precautions in respect to explosive or inflammable dust, gas, vapour or substance.

3.2.3 Management of Solid Wastes

Environmental Management Act (EMA), Cap 191 (Sections 114 – 118).
By developing the landfill and the solid waste management system as a whole, Kigoma – Ujiji Municipality has fulfilled its responsibility required by EMA which empower it to devise means for minimization of solid wastes and method of collection, transportation, treatment and disposal; as well as availing appropriate equipment and routes for collection; and designate transfer station / collection centres. The subproject ESMP will ensure proper functioning of the infrastructure and facilities.

Public Health Act, Cap 336 (2009)
By developing waste management infrastructure, the Municipality also has fulfilled PHA requirement that vest duty to LGA to set aside and manage areas in respect of solid (and liquid) wastes; collect, transport and dispose wastes from all sources; cleanse all receptacles; clean, maintain, and keep streets and public places, dumping sites and control scavengers at all waste sites. The subproject ESMP and specific Waste Management Plans will ensure that the infrastructure and facilities in the municipality operate as per these requirements.

Environmental Management (Hazardous Waste Control and Management) Regulations (2009)
The subproject ESMP and specific Waste Management Plans will ensure that the proposed landfill and its facilities have specific procedures and practices for storage, transportation, treatment and disposal of all categories of hazardous and toxic wastes including health care wastes, electrical and electronic wastes, pesticides, radioactive, industrial and consumer and chemical wastes. The monitoring procedures set in this ESIA will ensure periodic records and annual reports of the performance of the licensed waste management landfills.

3.2.4 Management of Water quality

Environmental Management Act (EMA), Cap 191 (Sections 61, 62, 123 – 129)
By developing storm water management infrastructure, the Kigoma – Ujiji Municipality also has fulfilled EMA requirement that vest duty to LGA to prepare for placement of storm water drains. The sub-project ESMP will adhere to provisions on discharge of sewage and management of liquid wastes and storm water.

Environmental Management (Water Quality Standards) Regulations (2007)

The sub-project ESMP will ensure safe distances of water supply systems from pollution sources for any infrastructure activity near water sources. The inclusion of Environmental Management Officers in project teams and approval of subproject ESMP will ensure no discharge of water polluting substances will go uncontrolled.

The Water Resources Management Act No. 11 of 2009
The Act provides for institutional and legal framework for sustainable management and development of water resources. Its main objective is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that among others meets the basic human needs of present and future generations, prevents and controls pollution of water resources and protects biological diversity especially the aquatic ecosystems.

Section 9 of this the law requires carrying out an Environmental Impact Assessment for any development in water resource areas or watershed. This ESIA is in line with this legal requirement, and the ESMP has provided measure to protect water resources in the subproject areas.

The Water Supply and Sanitation Act No. 12 of 2009
This is also a new legislation that provides for sustainable management and adequate operation and transparent regulation of water supply and sanitation services; provides for establishment of water supply and sanitation authorities as well as community owned water supply organizations; and provides for appointment for service providers. The main aim of this law is to ensure the right of every Tanzanian to have access to efficient, effective and sustainable water supply and sanitation services for all purposes by taking into account among others protection and conservation of water resources and development and promotion of public health and sanitation; and protection of the interest of customers. This law is in line with this project because the project will improve the sanitation of the Kigoma – Ujiji Municipality by provision of proper solid waste collection and disposal facilities.

3.2.5 Management of Soil Quality

Environmental Management (Soil Quality Standards) Regulations (2007)
The sub-project ESMP will ensure main polluting activity and discharge effluent are prevented from contaminating soils or subsoil.

3.2.6 Management of Noise

Environmental Management Act (EMA), Cap 191 (Sections 147).
The screening procedure used during scoping delineated all sorts of activities with potential to emitting noise and vibrations in order to control noise and vibration pollution into the environment.

3.2.7 Management of Land and Land-use

The Constitution of the United Republic of Tanzania Cap 2 (1977); National Land Policy (1997); Land Act, Cap 113 (R.E 2002); Land Acquisition Act, Cap. 118 (R.E 2002); Urban Planning Act No.8 (2007); Land Use Planning Act No. 6 (2007); Land (Assessment of the Value of Land for Compensation) Regulations (2001); Land (Compensation Claims) regulations (2001); Courts (Land Disputes Settlements) Act, Cap. 216 (2002).

These laws and regulations govern the use of land and other assets in urban areas including property and land rights, acquisition of land and other assets, rights and compensation, and dispute resolution and grievance mechanisms. The implementation of sub-projects in Kigoma - Ujiji does not entail land-take and thus no compensation issues have arisen.

3.2.8 Management of Public / Occupation Health and Safety

Occupational Health and Safety Act No. 5 (2003); Employment and Labour Relation Act Cap. 366 (2004); National Policy on HIV/AIDS (2001); The HIV and Aids (Prevention and Control) No. 28 (2008); Law of the Child Act No. 21 (2009); and Disabilities Act No. 9 (2010)

These Acts make provisions for safety, health and welfare of persons at work places and general public. Sub-project ESMP has incorporated measures that ensure employment opportunities to all while protecting right of children and people with disabilities and control of social illnesses. The occupation health and safety Act requires employers to provide a good working environment to workers in order to safeguard their health. The employers need to perform medical examinations to determine fitness before engaging employees. Thus, as stated in the ESMP, the Kigoma – Ujiji Municipality shall ensure that the equipment used by employees are safe and shall also provide proper working gear as appropriate. The contractors shall abode to the provisions of this Act.

3.2.9 Others Relevant to Infrastructure Development

National Transport Policy (2003)

The main objective of the policy is to improve infrastructure whilst minimizing wasteful exploitation of natural resources and enhancing environmental protection. Improving infrastructure assists in poverty reduction and eradication which is a major goal in Tanzania. Most activities in the project area depend in one way or another on the environment and therefore protection of the environment is vital.
In order to promote environmental protection whilst reducing poverty in rural areas, the policy direction is to:

- Influence use of alternative energy sources such as biogas and solar available at the residential localities instead of travelling long distances in search of firewood as a source of power; and
- Raise environmental awareness.

Sections 5.9 and 6.13 on Road Transport and Environment respectively give policy directions towards enhancing environmental protection through environmentally friendly and sustainable transport infrastructure both in the rural and urban areas.

The Road Act, 2007

For purposes of the Investment Subproject roads road upgrading project, the Act 2007 serves as a guide to the use of the road reserve. Contrary to previous informal understanding the reserve is exclusive to road related activities that do not include other utilities. However clause 29 (2) does give provision for the request and terms of approval for use of the road reserve by utilities such as power lines and water pipes.
On land acquisition the Act clearly states in part III, Section 16 that *'where it becomes necessary for the road authority to acquire a land owned by any person, the owner of such land shall be entitled to compensation for any development on such land in accordance with the Land Act and any other written law'.*

National Mineral Policy (1998)

The National Mineral Policy requires that mining activities are undertaken in a sustainable manner. Reclamation of land after mining activities is recommended. As far as this project is concerned, mining activities refer to quarrying and gravel extraction (borrow pits) activities.

Construction Industry Policy (2002)

Among the major objectives of the policy, include the promotion and application of cost effective and innovative technologies and practices to support socio-economic development activities such as road-works, water supply, sanitation, shelter delivery and income generating activities and to ensure application of practices, technologies and products which are not harmful to either the environment or human health.

Energy Policy (2003)

The continuing decline in industrial and agricultural production during the period between 1980 and 1985 led to increased inflation and a decline in the standard of living. In order to arrest this decline, the Government gave priority to the rehabilitation of the basic economic infrastructure facilities, especially communication, so that they can fully support the production sector. The energy policy considers the condition of roads as a determinant factor in vehicle energy use. Rough and pothole filled roads necessitate frequent braking and acceleration, leading to wasteful use of fuel; smooth, well-surfaced and well maintained roads lead to energy savings.

National Human Settlements Development Policy (2000)

Among the objectives of this policy to improve the level of the provision of infrastructure and social services for the development of sustainable human settlements and to make serviced land available for shelter to all sections of the community. Such infrastructure and services constitute the backbone of urban/rural economic activities. All weather roads and a reliable and efficient transport system, bus stands, drainage channels, and proper collection and disposal of solid waste are essential for sustainable human settlement development undertakings.

National Gender Policy (1999)

The key objective of this policy is to provide guidelines that will ensure that gender sensitive plans and strategies are developed in all sectors and institutions. While the policy aims at establishing strategies to eradicate poverty, it puts emphasis on gender quality and equal opportunity of both men and women to participate in development undertakings and to value the role-played by each member of society. This project will also ensure that women, who are the main users of the infrastructure, will be adequately involved at all levels of project planning to implementation.

Tanzania 2025 Development Vision

The Tanzania Vision 2025 aims at achieving a high quality livelihood for its people attain good governance through the rule of law and develop a strong and competitive economy. Developing core urban infrastructure is one of the most important agents to enable Tanzania achieve its Development Vision objectives (both social and economic), such as eradicating poverty, attaining water and food security, sustaining biodiversity and sensitive ecosystems. Providing good urban infrastructure through this project will contribute to the attainment of the 2025 Vision.

Land Use Planning Act (2007)

The Act provides for the procedures for the preparation, administration and enforcement of land use plans; to repeal the National Land Use Planning Commissioning Act and to provide for related matters. Among the objectives of the Act as given in Section 4 are to facilitate the orderly management of land use and to promote sustainable land use practices. Development of Urban Infrastructure that affects land use and livelihood shall comply with the provisions of this Act. Any infringement on existing land use shall need consultation with land use planning authorities.

Explosives Act, 538

The Act requires all persons intending to use explosives in their activities to apply for an explosive license. In construction projects, explosives may be needed in

material extraction from quarries and borrow pits. The developer shall apply for explosive license in case blasting becomes necessary at the working sites and/or materials extraction sites.

Environmental Assessment and Management Guidelines for the Road Sector

The Environmental Assessment and Management Guidelines for the Road Sector (EAMGRS) were developed in December 2004, just after EMA (2004) was enacted. The guidelines give procedures for the ESIA process as briefly explained in Table 3.1.

Table 3.1: Developed ESIA Procedures in the Road Sector

EIA PROCEDURES IN THE ROAD SECTOR (as per EAMGRS 2004)
Administrative Procedures:
EIA administrative procedures vary based on the significance of the environmental impacts. The Minister for Environment is responsible for projects with potential major environmental impacts. The EIA of projects with potential non-major environmental impacts are carried out under the Ministry responsible for the road sector and the Road Sector-Environmental Section (RS-ES).
Environment Application and Screening Process:
EA procedures in the road sector are initiated when the Road Implementing Agency (RIA) submits an Environment Application Form to the RS-ES during the Project Identification or Project Planning/Feasibility Study Phase. An environmental screening of the proposed project will determine whether the project will require: An Initial Environmental Examination (IEE); a Limited Environmental Analysis (LEA); or a detailed Environmental Impact Assessment (EIA).
Environmental Screening is done based on the information presented in the Environmental Application Form. The RS-ES is responsible for screening projects and this may acquire a reconnaissance study by an environmental specialist, especially if the project traverses sensitive areas or when there is potential for complex environmental issues.
All road projects with non-major environmental impacts shall be subject to an Initial Environmental Examination (lEE) or a Limited Environmental Analysis (LEA). Projects with major environmental impacts are subject to EIA. The RS-ES will register non-major-impact-projects. For major-impact-projects, the registration is done by NEMC.

Mining Act (1998)

This Act states that "building material" includes all forms of rock, stones, gravel, sand, clay, volcanic ash or cinder, or other minerals being used for the construction of buildings, roads, dams, aerodromes, or similar works but does not include gypsum, limestone being burned for the production of lime, or material used for the manufacture of cement.

This act make sure minerals are well controlled and Section 6(1) states that no person shall, on or in any land to which this act refers, prospect for minerals or carry on mining operations except under the authority of Mineral Right granted, or deemed to have been granted under this Act.

3.3 Institutional Framework for Environmental and Social Management

Environmental and Social Management Authorities
Environmental Management Authorities as per Environmental Management Act No. 20, Cap 191 (2004) and EIA Regulations:

National Environmental Advisory Committee
Advice the Minister Responsible for Environment on environmental issues requiring decision making

Minister Responsible for Environment
Issue guidelines and designate duties to various entities; approval by issuing of decision letter / ESIA Certificate for development projects; delegate responsibility for ESIA authorization to Director of Environment, LGAs and Sector Ministries.

Director of Environment
Coordinate, advise, assess, monitor and report environmental related aspects and activities; responsible for environmental policy and legal formulation and implementation; integration of environmental considerations into development policies, plans, programmes, strategies and projects; undertake strategic environmental assessment. The Director provides advice to Minister for approval of Environmental Impact Assessment report (EIS) and issuance of ESIA Certificate.

National Environment Management Council (A Body Corporate)
Undertake enforcement, compliance, review and monitoring of environmental impact assessment. NEMC role is to initiate /develop procedures and safeguards for the prevention of activities which may cause environmental degradation; provide advice and technical support to different stakeholders; enforce and ensure compliance of the national environmental quality standards. NEMC has specific roles and responsibilities to NEMC in the undertaking ESIA/PEA for new development projects (Part III – XI); Environmental Audit for existing development projects (Part X); and Environmental Monitoring and Reporting (Part XI). Under the EMA, NEMC is empowered to establish specific offices or to appoint or designate officers to effectively perform its functions.

- Registrar of ESIA Expert /Firm of Experts /Environmental Auditor/Environmental Inspectors: Register and keep registry of qualified firms/individuals authorized to offer services in undertaking ESIA, Initial and Control Environmental Audit Environmental Inspection, ESIA training and other technical support.
- Environmental Inspector (Appointed or Designated): Empowered to enter on any land, premise or facility of the project for the purpose of inspection, to examine records and to make enquiries on the project or for the purpose of monitoring the effects of activity carried out on that land, premise or facility upon the environment.

- NEMC Zonal Offices: Headed by Environmental Management Coordinators replicate all functions and departments of NEMC including overseeing Compliance and Enforcement; EIA; Research and Planning etc. Kigoma - Ujiji is serviced by the Lake Zone office in Mwanza.

Sector (Ministries) Environmental Sections
Responsible for all sector–specific environmental matters within the Ministry including participation in Cross-Sectoral Advisory Committee for review of ESIA Reports; review and verification of Environmental Audit Reports, monitoring on-going projects, and submit Monitoring reports to NEMC.

Regional Secretariat
Assist the Regional Commissioner; oversee/advise implementation of national policies, enforcement of laws and regulations at regional level. EMA, Cap. 191 Section 34 confers additional roles to the Regional Secretariat to coordinate all environmental matters within respective region.

Local Government Authorities
Perform basic functions including promoting social and economic wellbeing and development of areas and people within jurisdictions including relevant to environmental and social management. EMA, Cap. 191 Section 37 confers additional functions for the environment committees; give general powers to the LGAs including to undertake inquiries and investigations, summon any person, resolve conflicts among various parties, inspect and examine any premise, order to remove substance or article harmful to the environment and prosecute or sue any violator.

- LGA Environment Management Officer (designated / appointed): Enforce, advise the Environment Management Committee, gather/ manage information, and report on state of local environment. EMO are tasked to monitor the preparation, review and approval of environmental impact assessment for local investments.
- LGA Standing Committee on Urban Planning and Environment: The Committee is established under Section 42 (1) of the Local Government (Urban Authorities) Act, 1982 as a standing committee responsible for urban planning. EMA cover additional functions for the environment committees include overseeing proper management of environment within an urban area.
- Standing Committees of Economic Affairs, Works and Environment of a Township: Established under Section 96(1) of the Local Government (District Authorities) Act, 1982 while EMA, Cap. Additional functions for the environment committee include overseeing proper management of environment within a township.

3.4 Registered EIA Expert /Firm of Experts /Environmental Auditor/Environmental Inspectors:

Qualified firms/individuals authorized to offer services in undertaking ESIA, Initial and Control Environmental Audit Environmental Inspection, ESIA training and other technical supports.

Other Actors as per EIA and Audit Regulations, 2005

- Investor/ Developer / Project Proponent: oversee and meet costs of Environmental assessment and implementation of ESMP/ESMoP; undertake Initial Environmental Audits and Environmental Control Audit, Self-auditing during implementation of ESMP; undertake Baseline Survey before project implementation as basis for undertaking effective monitoring

General Public empowered by EMA and EIA Regulations to participate in all environmental management matters concerning them and at all stages of the ESIA process specifically to raise issues and concerns and to appeal when dissatisfied.

3.5 Other Authorities relevant to Infrastructure Development

Tanzania Electric Supply Company Limited (TANESCO)

Under the Ministry of Energy and Minerals, its core functions are generation, transmission, distribution, supply and use of electric energy. At so many location TANESCO use road reserves for transmission infrastructure. Kigoma – Ujiji Municipality collaborated with TANESCO Kigoma Regional office during the planning of subproject activities.

Water Basin Authority

Lake Tanganyika Basin in Kigoma is one of the nine Water Basins in Tanzania, established to manage water resources. All storm water drains in Kigoma -Ujiji ultimately discharges its water into Lake Tanganyika. The basin Management Authority was considered as one of main stakeholders for sub-projects implementation in Kigoma- Ujiji.

Water and Sewerage Authorities

Kigoma Urban Water and Sewerage Authority (KUWASA) offers water supply and sanitation services in the Municipality. The authority issue permits for discharging liquid wastes. The ESMP specifically states that the contractor shall apply for water extraction and waste water discharge permits as necessary.

Tanzania National Roads Agency (TANROADS)

Issue approvals or permit for undertaking physical works on roads or road reserves, issue permit for extraction of construction minerals, issue permit for using roads above set limits (tonnage, width etc.).

Occupational Health and Safety Authority (OSHA)

Oversee safety, health, security and welfare of persons at work, carries out all workplace inspections; hygiene surveys and measurements, occupational health examinations of workers, offer advice on ergonomics and scrutinize workplace drawings. It is provided in the ESMP that the Municipal shall engage OSHA expertise for inspections of works places during the operation phase.

Tanzania Commission for Aids (TACAIDS)
Prevention and control spread of HIV/AIDS, to promote advocacy and education on HIV/AIDS, to protect human and communal rights of people infected with and affected by HIV/AIDS

4.0 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

4.1 Spatial, Institutional and Temporal boundaries of Impacts

4.1.1 Spatial boundaries

The spatial dimension encompasses the geographical spread of the impacts regardless of whether they are short term or long term. The spatial scale considers the receptor environmental component and can be local or broader. Following this, two zones of impacts are considered:

The core impact zone: This includes the area immediately bordering the project (local). In the case of this project local impacts will include the site of the construction (borrow areas, quarries and the actual sub projects) and the immediate surrounding areas.
The zone of influence: This includes the wider geographical areas that are influenced by this project as sighted in the Kigoma-Ujiji Municipality.

For roads and drainage systems, the spatial boundaries extend from the carriage way, way leave and the adjoining areas. The spatial boundary of the roads extends along the roads length while its influence may extend to about 500m on either side of the road. For the bus stands and landfill area, the area of influence extends to around 500m around the lease area.

4.1.2 Institutional boundaries

Institutionally, Kigoma – Ujiji Municipal Council has the mandate to develop and maintain the urban infrastructure in the Municipality. Its primary function includes maintenance and development of the infrastructure to support economic and social development. The Council is also responsible for addressing environmental issues posed by the sub-projects. Roads, bus stands and storm water drainage will be under the municipal engineer while the operation of the landfill will be under the municipal health officer.
From the central government line of administration, by virtue of their location, the urban infrastructure facilities to be developed by this project in Kigoma region is under the jurisdiction of the Regional Commissioner for the Kigoma region.

4.1.3 Temporal boundaries

The temporal boundary of the proposed investment sub-projects in Kigoma-Ujiji Municipality refers to specific project cycles from mobilization, construction, operation and maintenance and decommissioning. Each sub-project phase is likely to have its own impacts, although some may be similar. The duration of impact resulting from a specific phase are likely to last to the end of the phase. Pre-constructional and constructional phases tend to bear short-term impacts.

Operational impacts are long-term, corresponding to the design period of the phase.

4.1.4 Area and Administrative structure

Administratively, the Kigoma/ Ujiji Municipality is divided into two divisions; Kigoma North and Kigoma South, and it is further more subdivided into 13 Wards and 200 *Mitaa*. The area covers about 128km^2; of which 127.85km^2 is land and 0.15km^2 are water bodies.

4.2 Physical Environment

4.2.1 Climatic Conditions

The climate in Kigoma/Ujiji is tropical with moderate to high rainfall averaging from 980 mm to 1,200 mm per annum, also falling in two distinct seasons i.e. between the months of October and December and between February and May. Kigoma/Ujiji falls within a wet climatic region. Kigoma-Ujiji further has a high day-time temperature (average 30^{o}C) and high humidity.

4.2.2 Geology and Soil

Geological information reveals that the subsoil in the Kigoma region mostly consists of LACUSTRINE sands (quartizitic) that have originated in the PRETOZOIC era. The sandy strata have good drainage properties associated with the undulating hilly areas in and around Kigoma/Ujiji.

Two rock types, from the Proterozoic in age, are exposed in the Kigoma-Ujiji area: The Kigoma quartzite of the Karagwe-Ankolean System, and the Manyovu red bed of the upper part of the Bukoban System. Locally the Kigoma quartzite consists mainly of white or gray medium- to coarse-grained ortho-quartzite, and the Manyovu red bed comprises a rounded cobble to pebble conglomerate.

The typical Manyovu red bed is predominant in hilly areas surrounding the Kigoma – Ujiji town and are in essence a derivative of seis-quioxide formations normally termed as laterites containing both iron and alumina minerals.

4.2.3 Topography and Drainage

The Municipal Council of **Kigoma/Ujiji** is located on the rift valley fringe of Lake Tanganyika, with large parts lying on terrain consisting of hills rising over 1,000 meters above sea level. However, the average altitude is 773 m to 960 m above sea level. The hilly terrain causes quick run-off of water resulting in severe soil erosion. This has been exacerbated by urban development and the growing population.

4.2.5 Population and ethnic group

According to 2012 Population and Housing Census, the Municipality had a population of about 215,458 people of which 104,185 were males and 111,273 were females with an average of 5.0 persons per household. While the original inhabitants of the Municipality are Wabembe, Wabwari, Wagoma, Wahorohoro, Wamanyema and Waha, there are now quite a good number of mixed tribes from neighbouring countries of Democratic Republic of Congo (DRC) and Burundi. This is due to trade and cultural relationships in the area. Other ethnic groups include Wafipa and Watongwe.

4.3 Biological Environment

As for many urban areas, Kigoma – Ujiji Municipality is deprived of vegetation mainly due to human activities and settlements. Apart from domestic animals kept by inhabitants of the town, there is no marked wildlife.

4.2.1 Natural Vegetation

The natural vegetation of the Municipality can only be seen in protected hill areas such as Katonga, Kibirizi, Masanga, Mwanga and Kitwe Sanctuary Forest Reserve with an average area of 425ha. Also they occur in areas abandoned by farmers where natural re-generation takes place. Natural vegetation in the Municipality can be divided into three main categories:-

- Hilltop Miombo: - Hilltop miombo are found on rocky hills mainly in protected areas.
- Miombo woodland: - Miombo woodlands are found on hills and middle to lower slopes mainly in uncultivated or abandoned land. They appear as closed woodlands (with limited human influence), occurring in protected areas (Forest Reserves) and open woodlands (due to human influence through uncontrolled utilization) when occurring in the public land.
- Swamp/Marsh areas: - These are permanently flooded areas containing large areas of wooded grassland and dark/closed grassland. Common swamps in the Municipality are found along Luiche river basin.

4.4 Economic Activities in Kigoma Municipality

The Kigoma - Ujiji started as one of the major slave trade collecting centres during the Arab occupation era. Although slave trading was later abolished it brought about a strong Islamic faith among the inhabitants. The Kigoma - Ujiji Town Council was established in 1962 by the Local Government Act Number 12. It was re-established by Act Number 8 of local Government Authorities in 1982 and upgraded to a Municipal Council from1 July 2005. The Kigoma/Ujiji area is one of the least developed in the country. This is due to lack of essential crops, industries, technical and entrepreneurial capacity.
The major economic activities are fishing, trading, small-scale agriculture and small-scale industries.

4.4.1 Fishing

Fishing activities are carried out mostly in Lake Tanganyika. The Kigoma - Ujiji area stretches 50 km from the Lake Tanganyika shore line in which fish production is potentially high. Fishing is carried out by artisanal fishermen. It contributes about 30% to the annual urban economy by creating employment opportunities to young men and women in fish processing and marketing of the fish products.

There are four fishing stations namely Kibirizi, Katonga, Ujiji and Shede. Although there has been an increase in the number of fishermen and low level fish processors the amount of fish has been decreasing. The fish caught at Lake Tanganyika is marketed in various parts of the country. The surplus produced is exported to the Democratic Republic of Congo, Burundi and Zambia.

Lake Tanganyika has a biodiversity in terms of species richness. The predominant fish species are 'Dagaa' (Stolothris Tanganyika) and 'Migebuka' (Luciolates Stappersii) which are endemic. Based on sustainable fishing industry development, local communities play a role in the conservation and protection of the natural heritage of Lake Tanganyika.

The fishing industry is facing many bottlenecks. Amongst these are poor and possess inadequate fishing facilities and processing techniques, outdated fishing gear and lack of technological and entrepreneurial skills. Fishing activities are also affected by Lake Piracy and lack of large scale fish processing industries.

4.4.2 Agriculture and Livestock

In line with the National Agriculture and Livestock Policy, the Municipality has to put emphasis on:-

- Irrigation Agriculture **(**small holding irrigation scheme produce in Kigoma/Ujiji Municipality is presented in Table 4.1)
- Community-based work, conducted in a participatory manner with farmers.
- Improvement of Agricultural extension services,
- Establishment of a sustainable food sector in agriculture;

- Improvement of the capacity of farmers/livestock keepers to produce on a sustainable basis; and
- Improved livestock productivity through the use of artificial insemination to improved animal breeds and disease control.

The main food crops grown in the area are cassava, maize, legumes, bananas, rice, sweet potatoes and beans. Main cash crops are palms and horticultural crops (including fruit) (see estimates in Table 4.2). Examples of livestock found in the Municipal area include cattle, goats, pigs, sheep and poultry.
The major issues needing attention are:-

- Inadequate livestock development infrastructure;
- Insufficient farming facilities and skills; and
- Insufficient agricultural implements.

Table 4.1: Irrigation Scheme in Kigoma/Ujiji Municipality

S/N	Name of Scheme	Type of Crop	Area (ha)	Production (ton)
1.	Luiche Valley	Rice	476	**1,238**
2.	Katandala	Rice	15	**39**
3.	Kirugu	Rice	10	**26**
4.	Burega	Tomatoes	606	**9,393**
	TOTAL		**1,107**	**10,696**

***Source**: Kigoma - Ujiji Agriculture and Livestock Department*

Table 4.2: Estimated Production of Major Cash Crop (Tons)

Crop	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Oil Palm	600	217.5	6,370	2,020	1,200	1,200	**1,200**
Hortculture	3,780	8,500	9,393	9,440	13,000	10,200	**13,000**
Total	**4,380**	**8,717.5**	**15,763**	**11,460**	**14,200**	**11,400**	**14,200**

***Source**: Kigoma - Ujiji Agriculture and Livestock department*

Livestock species kept in the Municipal include cattle, goats, pigs, sheep and poultry normally at zero grazing. Livestock population found in the Municipality for the past four years are indicated in Table 4.3:

Table 4.3: Estimated Livestock Population in Kigoma Urban

Year	Cattle	Goats	Sheep	Pigs	Poultry
2005	1209	3304	1036	1686	**77147**
2006	1876	3200	1181	1720	**78884**
2007	2252	3410	3410	3410	**79149**
2008	**2252**	**3410**	**1336**	**1886**	**79149**

***Source**: Kigoma - Ujiji Agriculture and Livestock Department.*

4.4.3 Trade and Business

About 75% of Municipal residents earn their living through trading, especially from the informal sector and business activities. There are more than 1500 registered individual businesses in the Municipality of which 70% are located in three main markets of Kigoma, Mwanga and Buzebazeba and other 5% do their business in six (6) small informal market points namely Ujiji, Kagera, Gungu, Nazareth, Kibirizi and Katonga. There are opportunities to develop these small markets to main markets.

A large number of shops are retailers selling manufactured and industrial goods. Goods like rice, beans, maize, sardines, clothes *(vitenge)* are being traded between Kigoma and neighbouring countries like DRC, Burundi, and Zambia. There are four commercial banks namely NBC, NMB, CRDB, and TPB that are running daily money transactions including money transferring, issuing of loans to borrowers and money exchange. The Municipal Authority gets own source revenue in the form of taxes from the trade and business sector which is about 4% of its total revenue. Moreover, the small scale industrial sector employs a number of people and manufactures several industrial products.

4.4.4 Tourism and Recreation

Ujiji is a historical Town, which began in the Arab era as a major slave collection centre. It is also a place where the ancient explorers Dr. David Livingstone and Henry Morton Stanley met in 1871 (Rendezvous point of Doctor Livingstone and Henry Morton Stanley at Ujiji). This centre also attracts foreign and local tourists to visit Gombe and Mahale National Parks. A beautiful beach belt along Lake Tanganyika is another attractive area for tourists and hotel investment.

High quality Tourist accommodation is available at Hilltop Hotel, Zanzibar Lodge Hotel etc. The Municipality has also several recreational points, Lake Tanganyika being the main site. Several other points are distributed throughout the Municipality. Among them, they include video show centres, beaches for swimming and indoor games. The Municipality has a modern gymnasium at the Kigoma Hilltop Hotel.

4.4.5 Industries

Due to intermittent power supply there are no large scale manufacturing industries, instead there are many small scale industries dealing with soap manufacturing, palm oil processing, milling machines, etc. At present the demand for power is only to the tune of 2.57 Megawatts which is supplied by TANESCO diesel powered generators. The shortage of power supply has been a great hindrance to the development of manufacturing industries in the Region, and the Municipality in particular.

4.5 Social Services in Kigoma – Ujiji Municipality

4.5.1 Health

In January 1992 a review was done to the national health policy and the new emphasis is on improving the health and wellbeing of Tanzanian with the focus on those most at risk and ensuring that the health system is more responsive to the needs of people. Kigoma - Ujiji Municipal Council has a few health facilities that provides services to the community which are owned by voluntary agencies, the private sector and the Government. Considering the current growing population, the facilities are not adequate as shown on Table 4.4.

Table 4.4: Number of Health Facilities by ownership.

Type of health facilities	Government	Private	Religious	Total
Hospital	1	0	1	2
Health Centre	1	1	0	2
Dispensaries	11	5	1	17
Total				**21**

Source: Kigoma - Ujiji Social-economical profile (2008)

Health Department has two major sections which are curative and preventive. These are important areas of working within the department. Other areas are Child Immunization and pregnant Mothers, Food and drugs Control, Tuberculosis and Leprosy control, HIV/AIDS, STI including voluntary counselling and Testing of HIV, School Health Program, IMCI, Malaria and National Health Insurance Fund. The major epidemic diseases in Kigoma - Ujiji Municipal Council are Cholera, Dysentery and Meningitis and the main cause of this epidemic are poor environmental sanitation, lack of clean and safe water.

4.5.2 Education

Pre-Primary Education

Young children (0-6 years old) are cared for and receive initial education in the pre-primary schools. The Council has 22 Pre-primary schools among which 16 are public owned schools and six are private owned.

Primary Education

The Council has 48 Primary Schools among which 45 are public schools and 3 schools are private ones. Up to the year 2012 the number of pupils in those 48 Primary schools is 41,680 among them 20,823 are boys and 20,857 are girls. There are 914 teachers and the Council have a shortage of 128 teachers. The standard I pupils enrolment in the Municipal for five preceding years is as shown in Table 4.5. An estimate of available schools infrastructure is shown in Table 4.6.

Table 4.5: Standard I Pupil's Enrolment From 2008-2013

YEAR	TARGET	ACTUAL ENROLMENT	PERCENTAGE, %
2008	4,856	6,505	128
2009	6,421	6,301	98
2010	5,879	5,810	99
2011	5,861	5,728	98
2012	4,767	6,414	135
2013	6094	6112	100.4

Source: Kigoma/Ujiji Social-economical profile (2014)

Table 4.6: Type of School Infrastructure)

No	Type of Infrastructure	Needs	Existing	Deficit	% Of Existing
1	Classrooms	1,042	419	623	40
2	Teachers' houses	1,067	83	984	8
3	Pit latrines	1,763	336	1,427	19
4	Offices	90	80	10	89
5	Store	107	23	84	21
6	Desks	20,840	7,815	13,025	38
7	Tables	1,719	678	1,041	39
8	Chairs	978	199	779	20
9	Cap board	1,477	127	1,350	9
10	Shubaka	90	70	20	78
	Total	29,173	9,830	19,343	34

Source: *Primary Education Officer Kigoma/Ujiji Municipality*

Secondary Education

Kigoma - Ujiji has got a total of 28 Secondary Schools, out of which 19 are public schools and 9 are private Secondary schools.

Other Institutions

Other institutions in the Municipal includes:-

- Zonal Training Centre – Clinical Officers Training Centre.
- National Metrological institute
- Lake Tanganyika Bible School
- Open University – Kigoma Branch
- Kigoma Home craft
- Sanganigwa II street children centre
- VETA – Kigoma
- Western Tanganyika College
- Newman College
- KAS Informatics

4.5.3 Water Supply

At the present, water demand is increasing because of increase of population and standard of living. The volume of water demand is 26,000 litres per day while supply is about 17,000 litres only per day, which is inadequate; 80% of population is served by piped water, shallow wells, Lake Water and three unprotected springs serves the remaining 20%. The piped water supply is being served by KUWASA (Kigoma Urban Water Supply and Sewerage Authority) and this service is still low, it only covers 65% of the Municipal residents and Water Supply capacity is only 37% of the total demand of the Town.

The Municipal Council through Rural Water Supply and Sanitation Program planned to have water Department which will deal with water services particularly in the peri-urban area, where KUWASA services have not yet reached. The Municipal Water Department is planning to improve local water source such as shallow wells, natural springs and constructing of boreholes. So far, there are a few projects within the Municipal Council which is run by the Community through donors to improve some water sources. These are:- Rutale Natural spring, Nyakageni Natural spring, Buteko natural Spring, Mwasenga, Relini, Buhanda, Msingeni, Mtolele and Kagera.
The peri-urban area has a population of over 59,000 people. Meanwhile, through RWSSP we have hired a consultant to carry out feasibility studies to design Water Projects in peri – urban areas of Kigoma/Ujiji. The design is now completed and construction of one scheme of Kibirizi which consists Kibirizi, Bushabani, Buronge, Mwasenga, Buhanda and Businde villages started early 2013.

The other four remaining schemes are scheduled to be implemented in phases upon securing of funds. All designed schemes are pumped water supply systems which will draw water from Lake Tanganyika.
Constructed schemes will be managed by community as established in each scheme.

4.5.4 Solid Waste Management

Kigoma - Ujiji Municipal Council suffers a low standard of service in respect to collection and disposal of solid waste. It commonly experiences crude dumping of waste disposal thus causing environmental and health hazards like unpleasant odour, breeding sites of vermin and contamination of surface and ground water.

Currently, the coverage of solid waste management service is about 30% of the total urban area in Kigoma - Ujiji Municipality. It is estimated that more than 50% of the waste generated in the Municipality is not collected, and as such it is either buried, left to decay or burnt near the source. The per capita solid waste generation rate in the Municipality is estimated to range between 0.30 and 0.33 kg per person per day (Kigoma – Ujiji Municipality database). This generation rate brings the total solid waste generation rate to between 50 and 60 tonnes/day. A major part of the waste is organic in nature.

Most of the commercial and domestic solid wastes generated in various areas are collected in the refusal bays situated in the central business district and there is no dumpsite. At household level, domestic waste is buried or burnt. Solid waste from un-designed transfer stations is transported and disposed of in gullies.

Core TSCP included construction of 30 solid waste collection points, installation of 40 skip buckets and provision of 2 skip master trucks and one wheel loader, targeting substantial improvement to the solid waste collection services at Kigoma – Ujiji Municipality. The existing landfill and the proposed additional cell will complete the management cycle by ensuring sanitary disposal facility for solid wastes and consequently the hygienic condition of the Municipality will be enhanced.

4.5.5 Transport

There are central railway line and road services between Kigoma, Tabora, Dodoma and Dar es Salaam. Also they join Mwanza, Bukoba and Mpanda. Water way transport services run from Kigoma town to Zambia, DRC and Burundi. Within the township there are reliable commuter services plying from Ujiji via CBD to Katonga, Kibirizi and Mwandiga.

Roads

Total length of road network by grade in the Municipality is 352 km as follows:-

(i) Gravel roads 71km with drainage system of 89km
(ii) Earth roads 266km with drainage system of 15km
(iii) Tarmac roads 15km with drainage rain system of 30km.

Most of the roads are not passable during rainy season due to inadequate side drains, soil erosion and poor maintenance and repair.

Railways: The Municipality is served by central railway line from Kigoma – Dar es Salaam which is about 1200Km in length.

Air Transport: The Municipality is served by airport that can accommodate Fokker Friendship class aircrafts.

4.5.6 Energy

Electricity

Urban and Rural electrification is an important economic infrastructure. Without it; the pace of development is slow. The major source of electricity in the Municipality is the power plant at Kigoma/Bangwe. Thermal electricity is mostly used by high income earners and small industries. There is electricity shortage in the urban due to the fact that Kigoma region is not connected to the National Grid and the electricity is being generated by independent thermal engines failing to meet the growing demand of electricity consumption.

Wood fuel

Municipal residents use fuel wood in the form of charcoal and firewood for domestic heating and cooking. Fuel wood is also used in brick burning, which now

aggravates its demand, causing an extensive deforestation hence rampant soil erosion and siltation.

Fossil Fuel

Most of the households in the municipality use fossil fuel for domestic lightening mostly kerosene due to the shortage of electricity. Industrial and transport uses for fossil fuels are also higher.

4.6 Kigoma – Ujiji Municipality Environmental Setting

4.6.1 Land

Characteristics of the land resource

The land is an environmental resource required by the people to live on. The development activities on land resource have a resultant environmental consequence. The existing municipal land use set-up (in the urban proper) resulted from and tells of the past and present development activities. This could possibly guide the future land use.

Land is under the control of the President and is held and administered for the use and common benefit, direct or indirect of the Native of Tanzania "(Land Acts No. 4 & 5 of 199)" basing on this ordinance land allocation has been pursued by the Local Government through the District Allocation Committee on behalf of the President. At present following the Central and Local Government reform land allocation is performed by the Local Government that is the Local Authority within their jurisdictional areas.

The Impacts of the Activity sectors on Land Resource

Extensive agricultural activities, uncontrolled forest activities and urban development activities such as rapid growth of unplanned settlements and infrastructure expansion contribute to environmental degradation, dwindling of the land resource base and disruption of the biodiversity.

4.6.2 Forests and Natural Vegetation

Characteristics of Forest and Natural Vegetation

There are two types of forests in the Municipality namely Natural Forest and Plantations (man–made). The natural forest has the following natural vegetation including wood, bush and grass lands which covers most parts of the area. This in turn is divided into two groups, namely Miombo, woodland which covers the great part of Forest Reserves and partially in public lands, bush land and bushed grass land considered to be deforested, forming a number of different vegetation types which have been cleared, browsed and selectively grazed for a long period. This is widely spread in public lands. Conservation of Forest resource is protected by Forest Act. No. 14 of 2002 and the related Municipal By-laws.

Man-made vegetation covers include trees planted along the collector roads in town; they provide shades to pedestrians. Vegetation of these plantations is mainly

dominated by tree species of *Albizia* and *senna spp*. Building pole harvesting is not carried out in these plantations.

The Impact of the Activity sectors on the Forest and Natural Vegetation

Deforestation has a major negative impact on the forest resource. Deforestation occur when people clear forests for agriculture expansion, bush fire outbreaks, use of fuel woods in brick burning, housing activities which put a high demand of forest related building materials such as poles and timber.

Clearing of forests and other natural vegetation causes macro and micro climatically changes and destroys biodiversity reducing soil fertility, and conservation of ground water; hence affect weather conditions, such as rainfall. Activity sectors which result into deforestation are real threats in many aspects including change of air quality since it is well known that trees utilize carbon dioxide to produce oxygen in their photosynthesis process.

Also an aesthetic destruction is an impact caused by clearing of forests together with uncontrolled felling of trees in many areas leaving bare land resulting into soil erosion and land degradation. Farming or agricultural activities in some wards pose a threat to forestry and natural vegetation resources.

4.6.3 Surface Water

Characteristics and importance of surface water and springs

Lake Tanganyika stretches for about 50km from north to south of the Municipality and has an average of 57km in width. It is a fresh water Lake and it is the second deepest in the world, next to lake Balkan in Siberia (Russia).

The municipality has also many rivers and fertile valleys that are suitable for irrigation including Luiche and Mungonya rivers with estimated potential area of 3030 Ha but the area under irrigation currently is only 605 Ha.

Lake Tanganyika is the major source of water for the municipality. Other water sources are springs namely Nyakageni, Rutale and Kirugu and Katosho pond. Also Water from the rivers like Luiche, Mungonya and Kaseke are sources of water for domestic and family uses. The raw lake water gravitates into a swamp and well at Bangwe estuary from which water is pumped to medium and high level tanks situated on the Mjimwema hill, near the central business district (CBD). Water demands for the township population is 26,000m^3/day but only an amount of 15,500m^3 /day (53%) is supplied. The present water intake is exposed to pollution due to siltation, oil from power generating plant, farming utilizing chemicals and lack of sewerage drainage systems.

The Impacts of activity sectors to surface water

Since the water production capacity is less than the demand, any increase in demand and use of water by any sector (irrigation, fishing, animal husbandry) put further strain on the resource. This results into the depletion of the resource. During the dry seasons, water quantities in the springs dwindle considerably. Lake Tanganyika is affected mostly by siltation due to agricultural and settlement

activities. Storm water drainage also contributes to siltation of the lake to a large extent.

4.6.4 Ground Water and Aquifers

Characteristics of Ground water

Most of the water resource that is naturally reserved in the ground comes from residual precipitation of the surface water infiltration into the soil and percolating downwards through porous layers. Underground water is normally protected in springs and ponds. Some of natural springs existing in the municipality are listed in the Table 4.7. Presently, there no substantial data showing the amount of water consumption contributed by the underground and aquifer water resources in the Municipality.

Table 4.7: Location and number of springs/ponds

Area	Number of springs/ponds
Rusimbi	**2**
Gungu	**4**
Kigoma/Bangwe	**2**
Kasimbu	**2**
Buhanda/Businde	**3**
Mwanga Kaskazini	**1**
Kagera	**2**
Total	**16**

***Source**: The Environmental Unit Kigoma - Ujiji Municipal Council, 2008*

The Impact of activity Sectors on the Environmental Resources:

Residential facilities such as sanitary facilities like pit latrines, septic tanks and sub-surface sewage disposal within 30m from the underground water source or on sloppy areas like a case of Kibirizi water spring, pose a danger of causing pollution to underground water. Agricultural activities such as the use of insecticides and chemical fertilizers may result into percolation of toxic pollutants through the ground and ultimately pollute underground water.

4.6.5 Air Quality

Characteristics of the Air resource:

Kigoma –Ujiji Municipality is situated on the undulating land and surrounded by hills in all directions; in the western and southern faces Lake Tanganyika which blows winds to off shores. The central area is relatively flat and bowl-shaped land. The surrounding hills act as wind barriers, blocking fresh air circulation on the Municipal land surface. Impended air circulation allows accumulation of air pollutants in the area. Dust dispersion from earth roads and unpaved/open ground is inevitable during the dry season. During rain seasons the air is fresh and sweet. The municipal areas have good tree cover mainly along the roads and other

plantations which purifies and adds quality to urban air. Trees give shade to pedestrians.

There are no readily available air quality spot measurements or monitoring data that can be used to gauge the air quality trends in the Municipality. As such, an evaluation of air quality trends in the Municipality can only be based on circumstantial evidence and tell-tale signs as well as use of comparative data. Circumstantial evidence of air pollutions is reflected in health statistics for air pollution related diseases.
Air pollution has been identified as actually and potentially coming from industries, mines and mineral processing sites; the sewerage system; households; traffic and solid waste disposal sites. Industries emit gaseous emissions including particulate matter as well as offensive odours, and noise.

The Impact of the activity sectors on the air quality

The following sectors pollute air in the Municipality.

Traffic
Most of the roads in the Municipality are not paved. As a result, vehicular traffic blows up dust. Cars emit exhaust gases including carbon dioxide, carbon monoxide as well as gases referred to as SO_2 and NO_2 which have negative public health and environmental impacts. Traffic air pollution is exacerbated by traffic volume, narrowness of streets, high densities of buildings, lack of open spaces and generally poor ventilation. Also, use of reconditioned vehicles which do not burn fuel efficiently escalates traffic air pollutions.
However, traffic volumes on most roads are normally light and traffic congestion is not very common. In the CBD, the housing density is rather high but most buildings are of low rise type. As such, air pollution does not seem to be a major problem at the moment, but with increase in the number of vehicles precautions need to be taken against air pollution.

Households
Household's use of biomass fuel like firewood produces air pollutants that are found in the combustion products. Since a large number of households in urban areas use firewood this is a significant source of air pollution largely because use of the biomass is done in enclosed spaces, in the kitchens, households produce indoor and outdoor air pollution.
Indoor air pollution affects the users of the fuel in the kitchen and other occupants in the house and also people outside. It is worthwhile to point out that indoor air pollution causes more deaths than outdoor air pollution, and its effects are more serious in a developing town like Kigoma – Ujiji.

Solid Waste collection Sites
Decaying solid waste at the disposal site produces offensive odours that are blown by wind and are able to cause nuisance to residents in the vicinity of the site.

Burning wastes produce smoke and other combustion products that also get access to residences in the vicinity of the disposal site.
The pollutants from burning waste pollute the air causing health hazards while the smoke can cause impairment of visibility. Other disposal sites in the municipality including those at households and institutions like the Maweni hospital where solid waste is burnt have similar environmental impacts.

Disposal of waste water
Overflowing of waste water due to blockages gives rise to offensive odours in the vicinity of the affected sites, thus polluting the air. Worse still, In the Municipality there is no central sewerage system; therefore the waste happening to gain access into the lake through the outfall is blown back to the shore giving rise to waves of offensive smell along the shore in close neighbourhoods.

4.7 Kigoma Municipality Environmental Priorities

Environmental priorities are drawn from the environmental setting of the Municipality (section 4.9), views of the stakeholders and the physical observations. The priorities include:

1. ***Flooding and Soil erosion***

Many parts of municipality are prone to flooding and soil erosion during rainy season. A number of highly and low-lying areas, including Katubuka and Lubengera which are formally/informally developed are prone to soil erosion and flooding. Flooding causes destruction of infrastructure services, damage to buildings, cause safety risks and create conditions that are conducive for the breeding of disease vector. Notably permanent gullies can be found in the affected areas, for example in Lubengera and NHC Katubuka during heavy rains. This is the major reason why Lubengera and Katubuka drains have been selected in this project to rescue major soil erosion and flooding in these areas.

2. ***Environmental Health and Sanitation***

For more than 15 years now, the sanitary condition of the municipality has been deteriorating steadily, the main cause being improper disposal of liquid and solid wastes, lack of reliable and safe water supply, inefficient storm water drainage and the existence of dilapidated buildings. The environmental health deficiencies have contributed to foul smells in residential areas and the Central Business District. The urban development activities leave open pits which turn into breeding sites for mosquitoes and other insects which transmit water-borne and water-vector diseases which affect the health of municipal residents. The municipality has just built a landfill for solid-waste disposal but does not have wastewater treatment facility for treating wastewater before disposal into the lake.

3. ***Water resources pollution***

The existing domestic liquid waste in municipality is disposed-off on–site mainly consisting of pit latrines and septic tanks - soak-away pit system. On–site waste

disposal practices have high likelihood of faecal contamination of ground water s and surface water sources in areas where water table levels are high and overflowing of wastes from these systems occurs like in Nyakageni, Kibirizi and Rutale springs.

Surface and ground water in the Municipality are polluted by seepages from pit latrines and soak–pits that find their way and pollute water sources. Industrial, commercial and residential liquid wastes discharged are into drainage systems pose dangers of polluting both ground and surface water. Fishing activities by using poisonous chemicals also pollute the lake water.
Along the shores of lake, springs and ponds; vegetable farming utilizing inorganic fertilizers and insecticides is being practiced. This is another potential source of pollution and siltation to the lake, springs and ponds

4.8Environmental Conditions in the Project Areas

4.8.1 Environmental conditions along Rusimbi Road

The 1.1 km road is gravel surfaced, with pot water ditches during the rainy season. The road has an irregular one sided storm water drain. There is neither flora nor fauna of ecological importance along the road. The road services a mix of commercial-residential area, with most of structures far outside the road reserve area (Figure 4.1). Utilities supply such as electric poles are also found along the road.

Figure 4.1: Condition of Rusimbi road

4.8.2 Environmental conditions at the main bus stand

The newly constructed main bus stand is located at Masanga area, 100m from Kasulu road. The stand was constructed during Core TSCP implementation and it is now in use. It was found that the stand lacks important facilities including a

fencing wall and ticketing offices. It is proposed that these facilities be constructed in this phase. Since the stand area is surrounded by residential areas, it needs a solid wall block to enclose it from other activities and also increase security to passengers and facilities in the stand area. Short of this there is a high risk of vandalism. Currently these facilities do not exist.

The stand area is fenced by a weak barbed wire mesh (as shown in Figure 4.2), completed by wrought iron gates. High light poles have been installed along the existing fence. Transport service providers have no proper officers for issuing tickets. The lack of ticketing offices at the stand area creates disturbance to clients and operators. There is a risk of passengers being conned by fake ticket issuers. It is proposed to build about 100 bus ticketing offices along the front and sides of the proposed perimeter wall. This location is strategic to allow easy access by customers.

Figure 4.2: The back wire fence at main bus stand

During the site visits it was established that the stand services more than 1,000 people per day. The stand has 8 flash toilet rooms and two bathrooms, and these are supplied by an elevated 5,000L water tank (Figure 4.3). It is obvious that the number of toilet facilities and the amount of water supplied cannot meet the demand. Assuming a minimum of 5,000 people per day, and water demand of 60 l/c/d, the stand will need a minimum of 300,000L per day.
Further it was noted that the bus stand has no waste collection bins. Other important facilities such as passengers waiting areas are well provided as shown in Figure 4.3.

Figure 4.2: Existing toilets (left) and passengers waiting areas (right)

4.8.3 Environmental conditions along the NHC Katubuka and Lubengera drains

Kigoma is characterized by loose soils which are very prone to erosion during rainy season. Total 3.2 km storm water drainage to be constructed by the project includes Luberenga Storm Water drain (600m) and NHC Katubuka Storm Water drain (1,000m). Both drains are facing massive erosion, and are a threat to adjacent facilities and structures.

Massive erosion was along Lubengera drain at location near the CCM office, where water erosion is threatening the building at another location near the Railway Station Bridge, water erosion has destroyed Gabions constructed during phase I (Figure 4.4).

Figure 4.3: Erosion (left) and destroyed gabions (right) along Lubengera drain

At some other points, the drains capacity have been reduced by siltation, overgrown grasses and solid waste disposal as it can be observed in Figure 4.4.
Siltation does not affect the drains capacity alone. It also poses a threat to the storm discharge point, the Lake Tanganyika. The Lake Tanganyika Water Basin

management expressed that there is fear that siltation is slowly reducing the depth of the lake. However, no studies have been done to assess this situation.

Figure 4.4 Accumulation of silts (L) and solid waste disposal (R)

Further, it was observed that the NHC-Katubuka drain has no proper access slabs for easy crossing of people from either side (Figure 4.5). People have placed wooden planks to cross over at some locations. During heavy rains the drain over floods and becomes very risky to cross. The farmers along NHC Katubuka complained about destruction of farms and farm lands. This was seen at a location where the Katubuka drain crosses the Airport road, where there is an under-sized culvert as shown in Figure 4.6.

Figure 4.5: Wooden planks used to cross over NHC-Katubuka drain

Figure 4.6: Crops affected by the flooding NHC-Katubuka drain

4.8.4 Environmental conditions of the Landfill site

Additional landfill cell is proposed at the newly constructed landfill, located at Msimba Ward in Kigoma District Council, about 14 km from Kigoma– Ujiji Municipal centre. The landfill is not yet operational. Once opened, the landfill will be able to collect wastes from all places within the Kigoma – Ujiji Municipality.

The proposed new landfill cell will increase the landfill capacity for waste storage. It will be constructed adjacent to the existing cell as shown in Figure 4.7.

Figure 4.7: Existing landfill cell and the adjacent site for the new cell

A number of landfill facilities were constructed during Core TSCP and these will also service the new landfill cell. That includes a weighing bridge, leachate collection pipes and a leachate collection pond, and storm water collection pond as shown in Figure 4.8. The leachate pond is lined with impermeable layer of

synthetic material. As the site visits were made during the rainy season, the ponds were found filled with rain water.

Figure 4.8: Existing leachate pond (L) and storm water collection pond (R)

Naturally the landfill site appears to be an erosion prone area. It was observed that rain water had eroded the sides of existing rain water diversion trenches around the site, and at some locations, the water also eroded the foundation of the fencing poles holding the fencing wire as shown in Figure 4.9.

Figure 4.9: The eroded fencing poles (L) and storm water drains (R) at the Msimba landfill

5.0 STAKEHOLDER'SIDENTIFICATION AND ANALYSIS

5.1 Stakeholders Identification

Simple methods such as networking, literature review and interviews were used in the process of stakeholder identification. From one stakeholder, the team was connected to another and another stakeholder, in a chain like manner. The main stakeholders included Kigoma Regional secretariats, Kigoma – Ujiji Municipal Council, Kigoma Urban Water Supply and Sewerage Authority (KUWASA), Lake Tanganyika Basin Offices, TANESCO, Tanzania Railway Authority, Local leaders at ward level and the local people in the areas of the project.

5.2 Stakeholders Involvement

Public participation was a process used, through which different stakeholders influence and shared their views regarding development initiatives and the decisions and resources that affect them. Comprehensive planning is required to ensure that local government, project staff and affected men and women interact regularly and purposefully during all stages of the project. The overall goal of the consultation process was to disseminate project information and to incorporate the views of stakeholders in the design of the Environmental and Social mitigation measures, management plan and Monitoring Plan. The specific aims of the consultation process were to:

- Improve Project design and, thereby, minimize conflicts and delays in implementation;
- Facilitate the development of appropriate and acceptable entitlement options;
- To collect inputs that would increase long term project sustainability and create a sense of ownership in the community;
- Reduce problems of institutional coordination and
- Increase the effectiveness and sustainability of income restoration strategies, and improve coping mechanisms.

An important element in the process of Impact Assessment is consulting with stakeholders to gather the information needed to complete the assessment. In the public consultation process, three types of consultation were considered. These were:

- Consultations with Municipal Councils.
- Consultations with the municipality utility supply companies/ authorities and

- Consultation with the communities living near proposed subprojects

Fundamentally these consultations were intended to disseminate Project information and to collect feedback regarding the project. It was intended to collect information regarding core urban infrastructure in the municipality, environmental issues and views and perceptions regarding the project.

5.3 Consultative Meetings at the Kigoma – Ujiji Municipal Council

Consultative meetings at Municipal and local levels included discussions with the Municipal Director and heads of departments including the Municipal Water Engineer, the Road Engineer, Health Officer, Economist, Development officer, Land Officers, Surveyors etc. These consultations were conducted through both direct personal interviews with selected technical people and focus group discussions.

5.4 Consultative Meetings with Water Authorities

These include the consultative Meetings and discussions with KUWASA officers and the Lake Tanganyika Basin Officers, These consultations were conducted through direct personal interviews.
Typically, the Agenda for these consultations included:

- Presenting the scope of the project.
- Discuss the role of the authorities in Management of water resources and environment as a whole.
- Obtaining from the authorities their environmental and socio-economic concerns and perceptions regarding the proposed Investment Subprojects.

5.5 Community Consultations

Dissemination of Project information among communities living near the proposed addition investment subprojects is an important aspect of the public participation process and they should be appropriately informed about what is planned. In addition, they, including women and youth, should be involved in a two-way dialogue regarding the Project.
The main objectives of community consultations were to:

- Provide clear and accurate information about the project to the communities along the road;
- Inform communities about the project schedule;
- Obtain the main concerns and perceptions of the population and their representatives regarding the project;
- Obtain opinions and suggestions directly from the affected communities on their preferred mitigation measures; and

- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

The entire consultation process of the project was seeking the present, opinions and concerns of local community regarding the proposed investment subprojects and involves them in the overall planning of mitigation measures.

The Agenda for the Community consultations included:

- Presenting the project
- Defining the local institutional framework and stakeholders;
- Obtaining from the local population their environmental and socio-economic concerns and perceptions regarding the proposed project; and
- The main concerns of the stakeholders included the positive anticipated impacts as well as negative impacts.

5.6 People's Attitude towards the project

The overall people's attitude towards the TSCP - AF sub-projects in Kigoma was very positive, mainly because they have witnessed to implementation of Core TSCP sub-projects, and thus they are optimistic that the current projects too shall be implemented successfully. The community is eager to realize the benefits of the project in terms of economic and social growth. They appreciate the World Bank (IDA) and Tanzania government effort to give its priority in improvement of the Municipality Infrastructure. Some stakeholder urged the Government/municipality to make sure that they hire a competent contractor for each subproject, and make close supervision of the works. This was raised with reference to shortcomings observed in Core sub-projects (i.e. storm water drains without cross-over slabs).

A summary of issues and concerns raised by various stakeholders is presented in Table 4.1. A column showing where relevant issues are addressed in the report is also provided. A list of people consulted is appended as Appendix I.

Table 4.1: Issues of Concern Raised during Consultative meetings

Stakeholder	Key issues discussed
Kigoma – Ujiji Municipal Council	• The Municipal authority has issued letters to all utility agencies, informing them about the project, and inviting then for site visits and discussions on the fate of affected infrastructure (if any) (see appendix III). • The Council, through ward and sub-ward leaders has disseminated relevant sub-projects information to the local community.
KUWASA (Discussion with the MD-Mr. Simon Lupanga)	• Development is needed in Kigoma – Ujiji Municipality • The main bus stand covers a relatively small area, especially because it is located in a strategic location (adjacent to the Kigoma - Tabora - Manyoni road), it will soon be too small for the growing population. He suggested that a new stand should be planned outside the town outskirts • The bus stand need to have more social services like water, security etc in order to take care the population that increases every day • Water at the bus stand is supplied by KUWASA. • The existing toilet rooms are not enough. However more toilets will soon be constructed under the "Sanitation project" • The storm water drainage are very important in order to avoid mosquito breeding sites and breeding sites for other disease causing organisms • The Municipal council should contact the KUWASA during initial stages of project design to discuss and agree on fate of KUWASA infrastructures to be affected (if any) • Disposal of waste water resulting from project activities should be properly done in septic tank-soak-away system. Currently the Municipal has no waste water treatment plant (it is under initial construction stage)
Acting Municipal Planner and Environmental officer (Mr. L. Nzilayilunde)	• Rehabilitation of sources of raw materials should be done immediately after material extraction phase is over. • Trucks hauling materials from source to sites must be covered to avoid environmental pollution and accidents. • During the operation phase, maintenance of storm water drainage is very important. A vegetation cover should be providing to reduce erosion risk. • The contractor must be well guided on issues of waste management. Disposal of construction wastes in gullies is prohibited. All waste must be disposed in a designed temporary dumpsite in Businde area.

	• Extension of Katubuka and Lubengera furthers to the end disposal (Lake Tanganyika), in order to reduce the rate of siltation. Implementation of the project will beatify the municipality, reduce soil erosion and enhance employment and business opportunities. Due to interaction and increase in population, the possibility of diseases is even higher.
Lake Tanganyika Water Basin (discussion with Mr. Dodomah V.-Ag BWO and Ms. Bonna M-Community Development Officer	• Culverts should be built wherever necessary. • Storm water drains should be part of road project. This will protect the road and reduce the rate of soil erosion • The Municipal should obtain water-use permit from the board before water extraction-.this is according to the Water Recourses Management Act No. 11 of 2009. The Msimba landfill is located near Mwandiga, where there is a water source. Care must be taken during design and construction to protect the source from landfill leachate. • The Municipal must get the EIA Certificate before the implementation of the project so that they can be sure of the mitigation measures that will be in place as far as water resources are concerned
Eng. Boniface William-Municipal Engineer	• The Lubengera storm water drain should be built all the way to the discharge point in order to avoid destruction of railway infrastructures located adjacent the drain at the railway station. • The design of the drains should take into account facilities and structures located close the drains (i.e. facilities very close the drain are such as part of Kigoma primary buildings and two shops near Kigoma market.) The design of Katubuka drains must include crossing concrete slabs to avoid accidents, especially during the rain seasons
Msimba Ward Leaders (VEO - Ms. Mariam Hussein)	• The villagers are informed and are comfortable with the Landfill project. • There was a land ownership conflict on the landfill site between Msimba and Mahenge villages. It has been successfully resolved. • The project should not be expanded beyond the original site boundaries. • The Municipal Council built a school known as Kasaka primary as part of the compensation to the village
Passengers and service providers found at the bus stand.	• The bus stand accommodate more than 100,000 per day and the services provided do not match with the number of people • There is only one tank for water supply of 5000L, which can only be used for 3 days. Due to limited water supply, sanitation issues are not well taken care at the bus stand • There are no bins for collection of wastes at the bus stand • The sanitary facilities are few, only 5 toilets for women, 3 for men, and 1 bathroom for each

	category • No security system • There is no office for the authority of the bus stand
Katubuka Wards Leaders (Discussion with WEO and residents)	• There should be concrete slabs along the Katubuka drainage so as to avoid accidents especially during the rain seasons. For now there are only wood planks which are risky. They suggested risky areas: near Katubuka Primary school, kwa Magolwa, near the market. • There exist a natural pond at Katububa, which receives some of the water from the drain. The pond over floods during heavy rains, leading to destruction of surrounding structures and farms. They suggested that there project should also construct large trenches to reduce flow into the pond. • The culvert located at Maguruweni area, across the air port road was under designed, leading to flooding of the road. The new design should increase the capacity of the culvert.

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SN	**Position/stakeholders**	**Views/Concerns**
1	Eng Nshimba TSCP-AF Coordinator	• The project is a continuation of the TSCP that improved various infrastructures within the City Council • For Kigoma Ujiji Municipal Council among others the project will improve storm water drainage to reduce floods, construction of a road and improve solid waste infrastructures and the bus stand • Most of the projects are being utilised on existing RoW therefore there will be no impact on individual properties
2	Ms Agnes Sanga-Community Development Officer	• The purpose of these meetings is to inform people about the project and that the implementation will take place soon. • Create temporary employment during the construction period • The project will increase the quality of settlement • There is a GRM within the Municipal Council to handle any complains arising from this project implementation therefore we argue you to choose your GRC

		members to facilitate the process
3	Kasingilima Mosque leader and community members	• We are aware of the proposed project and acknowledge that we have been consulted regarding the proposed project • The road is an important project for the mosque and the surrounding community • It is important to consider safety issues of the road at the mosque area as we our operations also involve crossing the road as there are activities in either side of the road • We have no problem with the minimal impact of the road to the annex structure of the mosque and would prefer in-kind compensation mainly for the authority to rehabilitate the part that will be affected • The design of the rehabilitation should be communicated to the mosque and agreed prior to implementation • A formal letter should be written by the Council to the Mosque • We will communicate the information regarding the project to the rest of the mosque community
	Local community and leaders of all six wards benefiting from the project	• We are aware of the proposed project and acknowledge that we have been consulted regarding the proposed project • Any complains raised during project implementation should be handled on a timely manner • What if the contactor during construction damages someone's property will this be compensated and how
	Transporters at the Kigoma Bus stand	• We acknowledge that the project has consulted us • The project should minimize construction activities during busy hours at the bus stand

6.0 IDENTIFICATION AND ASSESSMENT OF IMPACTS

6.1 Impacts Zones

The geographical spread of the impacts (short term or long term) is likely to encompass the following areas. The actual spatial dimension will vary with the nature of the impact and the receptor environmental and social component.

6.1.1 Primary corridor of impact

This is the core impact zone where the rehabilitation works will concentrate. The site of the construction is the Right of Way of the total length of Rusimbi road (1.10km), Katubula and Lubengera storm water drains, the bus stand perimeter and the landfill site perimeter. This will also include areas immediately bordering these subprojects.

6.1.2 Secondary impact area

These are off-site locations linked to the project activities including i.e. borrow areas, quarries and other sources of materials such as sand, gravel, aggregates, fill materials, water, etc involving civil works / extraction activities done by / or on behalf of the project. Other sites will be waste disposal sites, camp site (if so requires) or other location chosen for accommodation of crew and equipment and material storage. These secondary impact areas will be interspersed across the city and beyond where sources are located (refer Chapter 2).

6.1.3 General project area of influence

This includes the wider geographical area that is influenced by this project (in Kigoma – Ujiji Municipality and beyond) including areas in the near vicinity within a 5km radius and transportation routes from sources of material to the project location. For the bus stands and landfill area, the area of influence extends to around 500m around the lease area.

6.2 Impact Identification and Evaluation

The proposed additional investment subprojects in Kigoma – Ujiji Municipality can cause a wide range of environmental and social impacts on a number of receptors. The EIA and SIA identify these impacts for the purpose of mitigating the adverse

ones or enhancing the benefits. Impact *identification* is a process designed to ensure that all potentially significant impacts are identified and taken into account in the EIA process. A number of 'tools' are available to assist in impact identification. The simplest, and most frequently used, are *checklists* of impacts, although *matrices*, *network diagrams* and *map overlays* are also commonly used. In this EIA s*imple checklists and expert's knowledge were used*. These checklists are the simplest types that provide lists of potential impacts. These are designed to help practitioners to avoid overlooking some of the potential impacts.

The impacts are categorized into direct (short-term or long-term) or indirect impacts. The direct short-term impacts are considered to be those, which will be apparent only during the construction period and such will include mainly construction related impacts. Direct long-term impacts are considered to be those, which will be apparent after construction has been completed (but includes also impacts which may become apparent during the construction phase). The direct long-term impacts, therefore, include those that are construction related and those resulting from the use of the facilities. Indirect impacts are considered to be those, which may be encouraged or enabled due to the presence of these facilities. As such they will include social and economic impacts and tend to be long-term.

The main receptors of impacts associated with the proposed additional investment subprojects are mainly physical resources (hydrology, surface water quality, soils, air quality and noise), public health and safety, aesthetics and landscape.

The following impacts were identified to be likely to occur during pre-construction phase of the proposed additional investment subprojects;

ii. Job creation and increased income
iii. Change of scenery view of the project areas
iv. Air pollution

The following impacts were identified to be likely to occur during construction phase of the proposed additional investment subprojects;

xi. Job creation and increased income
xii. Increased dust and air pollution
xiii. Increased Noise and Vibrations
xiv. Pollution of surface and ground water
xv. Increased waste generation
xvi. Loss of definite materials and land degradation
xvii. Interuption or lack of utility servives due to damage/relocation of existing utility infrastructure
xviii. Lacking or slow restoration of areas impacted by construction
xix. Risks to worker's and public safety

xx. Overburdened Local Authority
xxi. Child Labour
xxii. Increased HIV/AIDS
xxiii. Population Influx
xxiv. Visual Intrusion during Construction

The following impacts were identified to be likely to occur during operational phase of the proposed additional investment subprojects;

i. Reduction of soil erosion
ii. Improved storm water collection
iii. Reduction in siltation of lake Tanganyika at the storm disposal point
iv. Job creation and increased income
v. Improved Community Life
vi. Improved Accessibility
vii. Increased security status of the new main bus stand
viii. Increased property and land values around the project areas
ix. Impacts associated with improper waste management
x. Risks of Ground and soil pollution by landfill leachate
xi. Risks of air pollution by landfill gases

The interaction between the intended project activities and the different environmental receptors are summarized in a simplified matrix presented in Table 6.1. A simple matrix with the following ratings was used to determine significant impacts:

+3 Very high positive impacts	+1 Minor positive impact	-1 Minor negative impact	-3 Very high negative impacts
+2 High positive impacts	0 No impacts	-2 High negative impacts	

The consultant focused on significant positive and negative impacts that were rated +2, +3, -2, -3 and developed mitigation and enhancement measures. In the next sections, significant impacts (positive and negative) associated with each phase of the project are discussed, before mitigation, enhancement measures and project alternatives are discussed in the next section.

Table 6.1: Environmental Impacts Matrix for proposed construction of Rusimbi Road

		Impact Rating Criteria					Impact Significance Rating			
S/N	**Environmental parameters/Impacts**	**Spatial Scale**	**Temporal Scale**	**Reversibility**	**Cumulative Effects**	**Residual Impact**	**Mobilization Phase**	**Construction Phase**	**Demobilization Phase**	**Operation and Maintenance**
	Negative Impacts									
1.	Change of scenery view	L	ST	R	✓		-1	-2	-2	+2
2.	Increased dust and air pollution	L	ST	R	✓		-1	-2	-2	-1
3.	Increased noise and vibrations	L	ST	R	✓		-1	-2	-2	-1
4.	Pollution of surface and ground water	L	MT	R	✓		-1	-2	0	0
5.	Soil erosion	L	ST	R			-1	-1	-1	-1
6.	Increased waste generation during construction	L	ST	R	✓		-2	-3	-2	-1
7.	Traffic disruption and congestion	R	ST	R	✓		-1	-3	-1	0
8.	Damage to existing infrastructure and public services	L	ST	R			0	-2	0	0
9.	Lacking or slow restoration of areas impacted by construction	R	MT	R		✓	0	0	-2	-1
10.	Risks to worker's and public safety	L	ST	R	✓		-1	-3	-1	0
11.	Loss of definite materials and land degradation	R	ST	R	✓	√	-1	-3	-1	-1
12.	Overburdened local authority	R	MT	R	✓		-1	-2	-1	-1
13.	Child labour	L	ST	R						
14.	Increased HIV/AIDS	R	LT	IR	✓	✓	-1	-1	-1	0
15.	Population Influx	L	ST	R	✓		-1	-1	-1	-1
16.	Visual Intrusion during construction	L	ST	R			-1	-1	-1	0
17.	Increased Accidents	L	MT	R	✓		-1	-1	-1	-1
	Positive Impacts									
1.	Job creation and increased income	R	ST				+2	+3	+2	+3
2.	Improved community life	R	LT			√	0	0	0	+3
3.	Improved accessibility	L	LT			√	0	0	0	+3
4.	Improved storm water collection and reduced soil erosion	R	LT				0	0	0	+3
	Reduction of dust dispersion	L	LT			√				+3
5.	Increased property and land values	R	LT			√	0	0	0	+3

Table 6.2: Environmental Impacts Matrix for proposed construction of fence and ticketing offices at the new bus stand

		Impact Rating Criteria					Impact Significance Rating			
S/N	**Environmental parameters/Impacts**	**Spatial Scale**	**Temporal Scale**	**Reversibility**	**Cumulative Effects**	**Residual Impact**	**Mobilization Phase**	**Construction Phase**	**Demobilization Phase**	**Operation and Maintenance**
	Negative Impacts									
1.	Change of scenery view	L	ST	R	✓		-1	-2	-2	+2
2.	Increased dust and air pollution	L	ST	R	✓		-1	-2	-2	-1
3.	Increased Noise and Vibrations	L	ST	R	✓		-1	-2	-2	-1
4.	Pollution of surface and ground water	L	MT	R	✓		-1	-2	0	0
6.	Increased waste generation during construction	L	ST	R	✓		-2	-3	-2	-1
9.	Lacking or slow restoration of areas impacted by construction	R	MT	R		✓	0	0	-2	-1
10.	Risks to worker's and public safety	L	ST	R	✓		-1	-3	-1	0
12.	Child Labour	L	ST	R						
13.	Increased HIV/AIDS	R	LT	IR	✓	✓	-1	-1	-1	0
15.	Visual Intrusion during Construction	L	ST	R			-1	-1	-1	0
	Positive Impacts									
1.	Job creation and increased income	R	ST				+2	+3	+1	+3
2.	Increased security level of the bus stand	R	LT			√	0	0	0	+3
3.	Increased status of the municipality	R	LT			√	0	0	0	+3
4.	Increased revenue collection	R	LT			√	0	0	0	

Table 6.3: Environmental Impacts Matrix for proposed extension of Storm water drains

		Impact Rating Criteria					Impact Significance Rating			
S/N	**Environmental parameters/Impacts**	**Spatial Scale**	**Temporal Scale**	**Reversibility**	**Cumulative Effects**	**Residual Impact**	**Mobilization Phase**	**Construction Phase**	**Demobilization Phase**	**Operation and Maintenance**
	Negative Impacts									
1.	Increased dust and air pollution	L	ST	R	✓		-1	-2	-2	-1
2.	Increased Noise and Vibrations	L	ST	R	✓		-1	-2	-2	-1
3.	Increased pollution of soil and surface water	L	MT	R	✓		-1	-2	0	0
4.	Increased waste generation during construction	L	ST	R	✓		-2	-3	-2	-1
5.	Lacking or slow restoration of areas impacted by construction	R	MT	R		✓	0	0	-2	-1
6.	Risks to worker's and public safety	L	ST	R	✓		-1	-3	-1	0
7.	Overburdened Local Authority	R	MT	R	✓		-1	-2	-1	-1
8.	Child Labour	L	ST	R						
9.	Increased HIV/AIDS	R	LT	IR	✓	✓	-1	-1	-1	0
10.	Population Influx	L	ST	R	✓		-1	-1	-1	-1
11.	Visual Intrusion during Construction	L	ST	R			-1	-1	-1	0
	Positive Impacts									
1.	Job creation and increased income	R	ST				+2	+3	+1	0
2.	Improved Community Life	R	LT			√	0	0	0	+3
3.	Reduction of rate of siltation of storm water drains and the receiving Lake)	L	LT			√	0	0	0	+3
4.	Improved storm water collection (reduced soil erosion)	R	LT				0	0	0	+3
5.	Reduction of floods and soil erosion	L	LT			√	0	0	0	+3

Table 6.4: Environmental Impacts Matrix for proposed construction of additional landfill cell

		Impact Rating Criteria					Impact Significance Rating			
S/N	**Environmental parameters/Impacts**	**Spatial Scale**	**Temporal Scale**	**Reversibility**	**Cumulative Effects**	**Residual Impact**	**Mobilization Phase**	**Construction Phase**	**Demobilization Phase**	**Operation and Maintenance**
Negative Impacts										
1.	Change of scenery view	L	ST	R	✓		-1	-2	-2	-2
2.	Increased Noise and Vibrations	L	ST	R	✓		-1	-2	-2	-1
3.	Increased dust and air pollution (by landfill gasses)	L	ST	R	✓		-1	-2	-2	-2
4.	Pollution of surface and ground water by leachate	L	MT	R	✓		-1	-2	0	-3
5.	Increased waste generation	L	ST	R	✓		-2	-3	-2	0
6.	Risks to worker's and public safety	L	ST	R	✓		-1	-3	-1	0
7.	Loss of vegetation cover	L	LT	R			0	-2	0	0
8.	Overburdened Local Authority	R	MT	R	✓		-1	-2	-1	-3
9.	Child Labour	L	ST	R			-1	-1	-1	-1
10.	Increased HIV/AIDS	R	LT	IR	✓	✓	-1	-1	-1	0
11.	Population Influx	L	ST	R	✓		-1	-1	-1	-1
Positive Impacts										
1.	Job creation and increased income	R	ST				+2	+3	+2	+3
2.	Improved Community Life	R	LT			√	0	0	0	+3
3.	Improvement to solid waste management system	L	LT			√	0	0	0	+3
4.	Increased property and land values	R	LT			√	0	0	0	+3

Key: Spatial Scale: Local (L), Regional (R), National (N)
Temporal Scale: Short Term (ST), Medium Term (MT), Long Term (LT)
Reversibility: Reversible (R), Irreversible (IR)
Significance: Highly Adverse (-3); Adverse (-2); Mild Adverse (-1); No impact (0); Mild Beneficial (+1); Beneficial (+2); highly Beneficial (+3)

6.3 Pre construction and Construction Phase Impacts

Short-Term Direct Positive Impacts: (All subprojects)

6.3.1 Job creation and increased income to local communities

During the mobilisation and construction phase, a number of people will get a chance to be employed by the project. It is expected that the unskilled /inexpert labour and some skilled labour will be sourced from the local people in Kigoma -Ujiji Municipality or from within Kigoma – Ujiji Municipality. Those who will secure employment though it is short term will get a modest payment which will help support their families for that time. Employment opportunities in the country are very scarce, especially for the unskilled people.

The presence of the construction force at site will bring a good business opportunity to local food and refreshment vendors at or near the project areas. The vendors are expected to benefit by selling food and other merchandise to the construction workforce and hence raise their economic status. Apart from the payment, it is hoped that the utilization of local labour will somehow cause a diffusion of knowledge from the skilled workers and hence open the door to the possibility of acquiring employment in similar construction works elsewhere.

Short-Term Direct Negative impacts

6.3.2 Risk of water and soil pollution

Whichever construction method used, small-scale and short-term water pollution may result especially during construction of off-road drainage structures. Impacts can also result from accidental spillage of fuels and construction materials, which may pollute both water and soil. Culvert construction may stir riverbed deposits into suspension. Though the large particles may settle quickly, the finer ones will increase the turbidity of surface water sources. The turbidity impacts may be short-term since the stream construction takes place within a few weeks.

All subproject entail construction of drainage channels in order to drain concentrated run-off from the road, bus stands, and landfill. Water or soil pollution by accidental spillage of fuel or other materials and chemicals associated with construction is an undesirable possibility. Obviously, it is not possible to predict the location or type of spillage, but it is considered that any spillage to soil will be local in nature and remediation should not be difficult.
All storm water collected from the project areas is eventually discharged into Lake Tanganyika, thus could cause lake water pollution. However, it is expected that this impact will be of low significance due to possible natural filtration of pollutants through soil as water flows to the disposal point.

6.3.3 Noise, vibration and air pollution (including GHGs)

Dust will arise from construction site due to excavation work, movement of vehicles, stock piling of materials, operation of crusher and asphalt plants, and general earth works at the site. Exhaust fumes will mainly come from construction plant, machinery and vehicles in operation. Fumes will also come from the processing of asphalt. Dust and fumes will have major direct but short-term impacts during the project construction phase. Along the project sites, the adjacent areas are relatively open, without impediment to air movement hence enhance dilution of air pollutants. For areas away from the construction sites, leafy vegetation should be able to filter out a considerable content of low level air borne pollutants. Thus, ventilation and vegetation are anticipated to lessen the air pollution problem. Moreover, sprinkling of the road with water during construction work will further lessen generation of dust, and consequently alleviate the air pollution problem.
Noise and vibration will be produced by construction vehicles, plant and machinery during delivery of materials, processing of materials, and actual construction work. Due to an increase in activities and number of operational vehicles, the impacts of noise and vibration will cause disturbance to humans. Vibration may even cause physical damage to properties near the construction site. The vegetation and loose soil in the project area have potential for damping noise and vibration. As such, noise and vibration impacts will have short range – near the construction site. Dust will be a temporary nuisance to the people within the core impact area especially during construction in the dry season.

Construction activities will lead to emissions emanated from fuel powered equipment i.e. vehicles engines and construction equipment etc. Exhaust contain pollutants notably carbon-dioxide (CO_2) plus small quantities of noxious gases such as nitrogen oxides (NO_x), sulphur dioxides (SO_x), hydrocarbons and particulate matters (PM). These Green House Gases (GHGs) are known to interfere with temperature regime and cause climate change effects.

6.3.4 Accelerated Soil Erosion

Construction works have potential to accelerate soil erosion problems in most cut sections. Nevertheless, all cuts in the sloping grounds should be refurbished firmly and provided with the vegetation cover and also; stabilized by stone-pitched surfaces to reduce the effect of soil erosion and keeping the slopes intact. Major soil erosion is expected at the quarry sites and borrow pits. However, the sources of construction materialf for this project shall be from legalised borrow/sand pits which are being monitored the Kigoma Ujiji-MC in order to reduce impacts of material quarrying on the sites.

6.3.5 Increased Generation of Wastes

Construction activities are associated with production of wastes, resulting from human and machines activities at the construction sites and at the campsites. These

wastes includes solid wasteand liquid waste. Solid wastes include, spoil, rubbles, tree logs, metals, glasses, papers etc while the liquid waste include sewage, sullage, oils etc. These wastes if not well handled can change the aesthetic nature of the project area and can even lead to water pollution in case of improper disposal of oils. The quantities and types of wastes have been estimated and are presented in Chapter 2 of this report.Pollution of land from inadequate waste management is considered to be local and short term because of their small quantity and nature.

6.3.6 Loss of Vegetation

The proposed area for additional landfill site has few young grasses (Figure 6.1). Its natural vegetation cover was removed during the construction of the existing cell. During construction of the proposed cell the existing vegetation will be removed.

Figure 6.1: Vegetation cover at the landfill cell site

6.3.7 Damage/relocation of Infrastructure &loss of access to Services

Mobilisation and construction activities might result into temporal loss of access to services such as water supply, electricity and road passage. Further it has effects in terms of cost implications to the authorities managing the infrastructures, and temporal lack of service to the community provided by these infrastructures.

Currently, the extent of relocation to utility infrastructure is not known as the design team is yet to finalise works. The Kigoma Ujiji municipal Engineer has approached the utility providers (TANESCO, TTCL and KUWASA) to participate in surveying the project areas in order to give an evaluation of the extent of relocation and costs involved.

On the other hand, placement of material along the road, temporal blockage of roads and construction of drainage may result into loss of access to road users, thus, road users might be forced to use other roads/pathways and thus spend more time on the road.

6.3.8 Worker's and Public Safety risk

Construction activities exposes the labourers and the general public to bronchial and other respiratory tract diseases due to dusts. Also poor use (or not using at all) of the safety gears during construction phase will result into loss of lives or injuries during construction. The incidence rate of water borne diseases such as cholera and diarrhoea will increase if there will be no proper sanitation practices at the camps.
Also Traffic hazards might occur during contruction of Rusimbi Road, resulting from placement of materials on the road, and from temporary road closure Lack of space adjacent the road reduces chances for creation of detours or even pedestrian pathways during construction.

6.3.9 Lacking or slow restoration of areas impacted by construction

If demobilization of the project is not done at all or done in a very slow pace it can cause a number of environmental impacts including, scenic quality deterioration, acceleration of spread of vector spread diseases like malaria as a result of water ponding; and accidents. Generally for urban projects, scenic quality deterioration is the major impact. Scenic quality deterioration is expected to occur on site due to stock piling of construction materials and top soils. Excavation work as well as presence of construction vehicles, plant and equipment will also add to scenic quality deterioration. Scenic quality deterioration will also occur off-site, at the sources of construction materials, the quarries and sand mines. Scenic quality deterioration can destroy the economic and aesthetic value of public and/or private property including land. Scenic quality degradation effects will be significant but reversible, short term and direct.

Long-Term Impacts:

6.3.10 Overburdened local authorities

The implementation of the proposed Investment subprojects (from planning stage, construction stage, and supervision) will involve the local authority. The local authorities in this context include Ward and Mtaa Leaders. If these local authorities are not involved in all phases of the project then it shall be very difficult to cope with the project implementation pace, and as a result they shall be overburdened by the project which may result in poor performance of the proposed investment subprojects. This impact can be short term or long term, depending on the nature of overburden felt the local authority. For example, managing the landfill activities can be a burden during planning, construction and operation.

6.3.11 Increased spread of HIV/AIDS

The major health risk the possibility of acceleration of spread of STDs and HIV/AIDS, is always there when there is influx and or intermixing of people. Unhealthy social interaction might exist, as fuelled by many factors including economic benefits (i.e.

from the construction force to the local community). Unhealthy social interactions can result in an increase in the incidence of such disease occurrences.

6.3.12 Loss of definite materials and land degradation

Construction of these investment subprojects will have direct impacts related to excavation; quarrying and deposition of spoil material. Significant volumes of earthworks fill; gravel and rocks will be extracted during project execution.
Quarrying involves clearing the vegetation at the sites, excavation and transportation of the material. Thus, borrowing and quarrying activities will cause habitat change, land degradation (due to removal of fertile top soil), landscape impairment (visual intrusion) and soil erosion-which lead to siltation of waterways. Quarrying, excavation and the disposal of spoil material can destroy the economic and aesthetic value of public and/or private property including land. Some species may be affected during construction, but not to the level of extinction. However, establishment of detour routes during construction may damage some species.

Scenic quality deterioration will occur due to stock piling of construction materials and discoloration of plant leaves and houses in the vicinity of the roads due to wind-blown dust. Excavation work as well as presence of construction vehicles, plant and equipment will also add to scenic quality deterioration. Scenic quality deterioration will also occur off-site, at the sources of construction materials, the quarries and sand mines.

Abandoned borrow pits have damaging effects (as experienced in other parts of Tanzania). Borrow pits and quarry sites provide good environments for disease vectors and thus posing serious public health hazards. Abandoned pits filled with water harbour disease vectors responsible for transmission of malaria and *schistosomiasis*. If not properly managed they may become an eyesore. Scenic quality deterioration can destroy the economic and aesthetic value of public and/or private property including land. Scenic quality degradation effects will be significant, short term and direct. They will, in spite of everything, be manageable given proper site operation and prior warning as well as issuance of site operation guidelines.

Secondary impacts at points of extraction of the construction materials may include depletion of local construction materials e.g. stones/aggregates, sand, gravel, cobblestones, and fill materials. However, this is unlikely as the amount of materials is small and the sources of construction materials exist and are authorised.

6.4 Operation Phase Impacts (All Sub-projects)

Positive Long-Term -Impacts

6.4.1 Improved Transport and Economy of the People

Upgrading of Rusimbi road from its existing poor condition will facilitate easy transportation within the surrounding areas, and increase interconnectivity of Kigoma

- Ujiji Municipality. It is hoped that the road improvements will reduce travel time around the city and consequently reduce travel costs. Road safety and access will be improved by provision of walkways, safety signs and street lights.
The improved road have potential to boost up the existing informal sector, which is a source of self-employment for mainly women and youth by ensure increased commuting speed and thereby facilitating the goods exchange in the informal sector. There is potential for emergency of new small business along the new road and thus create more income to people.

6.4.2 Improved community life and services

In general, the current socio-economic status of the project areas will be improved and the general outlook will be beautified. The improved road and storm drainage will reduce soil erosion and floods in respective areas, thereby enhancing the status of the Municipality. Improvements to the bus stand will raise status of the stand and municipality in general. The benefits of the improved road, storm water drainage and bus stand will be long term, and will be experienced both at the core impact zone and at the zone of influence.

6.4.3 Reduction of floods and soil erosion

Lack of adequate storm water collection systems has accelerated soil erosion and floods in the project areas. Improvement to NHC-Katubuka and Lubengera drains will facilitate collection of storm water from the municipality area and allow its safe disposal into the Lake. Evidently storm water has caused significant soil erosion in some locations in the municipality as described in Chapter 4. Improvement to these drainages will allow smooth flow of water to the discharge point and hence reduce the extent of soil erosion along these natural drains.

As smooth flow of rain water is enhanced, there will also be reduction of floods and stagnant water in areas near the drains. Floods and stagnant water around the residential houses creates nuisance and causes a lot of inconvenience to the residents as it becomes breeding sites for disease causing organisms such mosquitoes and other disease vectors.

6.4.4 Reduction of rate of siltation of storm water drains and the receiving Lake)

Uncontrolled storm water carries silt and solid waste from upstream areas down to the disposal area. Siltation was observed to reduce carrying capacity of storm water drains as silt slowly accumulates at the bottom. Silt and solid waste was observed to block culverts at several locations along the NHC-Katubuka drainage, as shown in Figure 6.2. According to the Lake Tanganyika Basin Management, it is possible that silt disposal at the lake outfall has reduced the Lake depth at that point. However, no research has been done to investigate the rate of siltation or its effects to the Lake.

Figure 6.2: Siltation of Lubengere (L) and NHC-Katukuka (R) drains

6.4.5 Job creation and increased income to local communities

There would also likely be employment availability during the operation phase of the landfill. A number of people will be employed to run the weighing bridge, operate the gate or direct waste hauling vehicles on site. Further, there is potential for the local people to get employed in waste sorting (and recycling of valuable items) within the landfill.

Employment opportunities are also feasible at the bus stand, where at least 50 people will be employed in issuing bus tickets.

Short time employment in the maintenance of storm drains and Rusimbi road (such as grass cutting, cleaning drainage culverts, etc; as well as some clerical / low level supervision jobs) will be made possible. Such employment would contribute to poverty reduction, especially for unskilled and or low income people in the project areas.

6.4.6 Increased Municipal revenue collection

Revenue collection at the bus stand will be yet another income generation activity for the Municipality. Revenue will be collected from the ticketing office and from passengers entering the stand area.

6.4.7Increased property values

It is obvious that improved road will increase the property values along the road (plots, farms, buildings etc). This will be an advantage to the property owners since the resell value and rent will increase. Also the city and national income will increase through the property tax. However, the rise of property value will b e disadvantage to tenants and investors.

6.4.8 Improvement to solid waste management in Kigoma Municipality

There is no operating landfill in Kigoma – Ujiji Municipality, as such; municipal solid waste is haphazardly disposed in a temporary dump in Businde area. Construction of a new cell at the newly constructed landfill aims to increase the landfill capacity, and

thus enhance waste management in the municipality. The cell will be constructed in a manner that prevents pollution of ground and surface water, and air pollution. Usage of this new landfill will stop the ongoing haphazard waste dumping at Businde area and therefore reduce the rate of environmental pollution at Businde.

6.4.9 Improved air quality

One of the major impacts of unpaved roads to air quality is the dispersion of dust particles into the atmosphere and its disposal on structures and facilities. Improvement of Rusimbi road will significantly reduce dust dispersion caused by vehicle movement and wind surface erosion on unpaved road. Reduction in dust dispersion and deposition will enhance the aesthetic value of areas along the project and also reduce health impacts associated with dust contaminated air.

Negative Long-Term Impacts

6.4.10 Interference to local hydrology

Construction of the landfill cell will cause interference to the local hydrology and drainage aspects of the area. The local drainage will be routed away from the landfill area for the whole project life. Run-off trenches have been dug to safely carry the uncontaminated runoff to receiving ponds.

Further interference to local hydrology could occur at the material quarry sites if they are not timely managed. Water stagnation in sand pits and borrow pits can become potential breeding sites for mosquitoes.

Improvement of Lubengera and NHC-Katubuka storm water drainage in Kigoma – Ujiji Municipality will include concrete lining of the banks and bottom of the channel. This will direct the storm water to the disposal site (into Lake Tanganyika) and there will be no infiltration of the storm water to the ground. This will interfere with the local hydrology of the project area.

6.4.11 Risk of ground water pollution by leachate

Groundwater contamination is a major concern in landfill operations because of the pollution effects of landfill leachate and its potential health. The greatest contamination threat to groundwater comes from the leachate generated from the fill material which most often contains toxic substances especially when wastes of industrial origin are land-filled. However, it has been widely reported that leachate from landfills for non-hazardous waste could as well contain complex organic compounds, chlorinated hydrocarbons and metals at concentrations which pose a threat to both surface and ground waters. Solvents and other synthetic organic chemicals constitute a significant hazard, being of environmental significance at very low concentrations and resistant to degradation.

Moreover, they may be transformed in some cases into more hazardous compounds. Most landfill leachate has high levels of BOD, COD, ammonia, chloride, sodium, potassium, hardness and boron. The conditions within a landfill often vary over time, from aerobic to anaerobic thus allowing different chemical reactions to take place. The leachate from landfills for non-hazardous waste could produce reducing conditions at landfill base thereby enhancing the percolation of iron and manganese solution from the underlying deposits. The chemical composition of leachate varies due to a number of different known factors as the age, type of waste, operational practices at the site and percolation rate through the fill to the groundwater. Heavy metals such as cadmium, arsenic, chromium have been reported at excessive levels in groundwater due to landfills operations.

6.4.12 Risks of explosions and fire hazards

Open and subsurface fires are more likely to happen during operation phase of the landfill. These fires may be due to: explosion of methane gas produced from anaerobic conditions of the subsurface environment; scavengers activities e.g.smoking or cooking, or from naturally explosive wastes.
These fires can pose a serious danger to environment (in terms of air pollution) and human health.

6.4.13 Threats to public health and workers safety

Improper operation of the landfill could lead to creation of breaking sites for disease vectors. It could also lead spread of waste by scavenger birds, rats and pets to the nearby community; and cause outbreak of disease. For example, flies and other rodents can carry bacteria from the dump to homes, and cause eruption of diseases such as diarrhoea and dysentery. Stagnant water in the landfill will favour generation of mosquitoes, vectors malaria parasite. Rats and other rodents spread diseases such as rabies, rat-bite fever, typhus, plague etc. Rodents are brought in to site in loads of wastes or migrate from surrounding areas. They remain in the facility if there is food, shelter and water. Scavenger birds can also play a big role in spreading uncovered wastes. Scavenger birds can create nuisance and unsanitary conditions to the community near waste dumps.

Unsanitary conditions in an improperly managed landfill could cause significant health threats to the dump workers. The exposure route could be though dermal contact, ingestion (with water or food) or through inhalation, after contaminants increase into the air. Apart from health risks, workers will also be faced with accident risks from the plant equipment and vehicles.

6.4.14 Road Accidents

Road deaths, injuries and damage to property are most tangible negative impacts on the community environment and may be reduced or increased as a result of road projects. The project roads transverse community areas and the effects the road causes

on safety in these settlements are dependent on location. Vehicles travelling at increased speeds will make it difficult for road users to cross the road, particular animals, children and elderly people will be at risk of accidents.

6.4.15 Increased noise and vibration and air pollution

Landfill operations always cause air pollution if it is not operated and maintained properly. The following are the major causes of this pollution

- Airborne or windblown particulates of solid wastes
- Odour and biogas due to biodegradation of organic wastes
- Toxic gasses from toxic wastes
- Particulates and toxic gas due to open burning
- Sulphur and Nitrogen oxides, carbon monoxide, etc. from vehicle emissions
- Noise and vibration due to traffic and heavy equipment works.

6.4.16 Occupational Health effects

Solid wastes can come into direct contact with human beings at several stages in waste cycle. For the case of landfill the group at risk is workers in the landfill. Table 6.1 outlines health risks that are posed to waste workers;

Table 6.1: Occupational hazards associated with waste handling

INFECTIONS

- Skin and blood infections resulting from direct contact with the waste, and from infected wounds
- Eye and respiratory infections resulting from exposure to infected dust
- Zoonoses resulting from bite by wild or stray animals feeding on wastes
- Enteric infections transmitted by flies feeding on wastes

ACCIDENTS

- Musculoskeletal disorder result from handling heavy containers
- Wounds, most often infected, resulting from contact with sharp items
- Poisoning and chemical burns resulting from contact with small amount of hazardous chemical waste mixed with general waste.
- Burns and other injuries resulting from occupational accidents at waste disposal sites or from methane gas explosions at landfill gasses.

(**Source**: UNEP 1996)

7.0 IMPACTS MITIGATION MEASURES

This Section is devoted to describing measures or actions that shall be implemented so as to minimize any of the potential impacts identified in the preceding section. Many of the mitigation measures put forward are nothing more than good engineering practice that shall be adhered to during the design and construction phases. The developer is committed in implementing the mitigation measures contained in this report.

7.1 Mitigation Measures for Impacts during Pre -Construction and Construction Phase

Enhancement of positive Impacts

7.1.1 Job creation and increased income to local communities

- The developer should ensure sustainability of the proposed projects by monitoring the operation of each facility, including the monitoring of revenue collection where applicable.
- To ensure sustainability, the developer should create awareness amongst the users and operators of the facilities as required
- The public should be involved from initial stages to create a sense of ownership.

Mitigation of Negative Impacts

7.1.2 Risk of water and soil pollution

- The developer is responsible for compliance with the relevant Tanzanian legislation relevant to wastewater discharges into watercourses.
- Portable or constructed toilets must be provided on construction sites for use by the construction force.
- Wastewater from toilets, kitchens, showers, sinks, etc. shall be discharged into a sealed holding tank or into septic tanks systems for removal from construction sites. There should be no direct discharges to any water body.
- Wastewater that does not meet the standards set by relevant Tanzanian technical standards/regulations must be collected in a sealed holding tank and removed from site by licensed waste collectors.
- The developer should use techniques such as berms or flow diversion during construction to limit the exposure of disturbed sediments to moving water
- Before the start of construction, the developer should obtain all necessary wastewater disposal permits/licenses and/or finalize all necessary wastewater disposal contracts.
- At completion of construction works, wastewater collection tanks and septic tanks shall be safely disposed or effectively sealed off.

7.1.3 Noise, vibration and air pollution during construction phase

- The developer is responsible for compliance with the relevant Tanzanian legislation with respect to noise and vibration.
- When needed, the developer should implement measures to reduce noise to acceptable levels; this should include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas.
- The developer should avoid, or at least minimize, heavy vehicle traffic (carrying construction materials) or noisy material processing facilities through or near residential areas.
- The developer and contractor should plan activities in consultation with local communities so high noisy activities are done during day time and thus reduce the level of disturbance.

7.1.4 Accelerated Soil Erosion

- The developer shall follow the detailed drainage designs included in the construction plans, intended to prevent storm water from causing local flooding or scouring slopes and areas of unprotected soil, resulting in heavy sediment loads affecting local watercourses.
- Ensure drainage system is always well maintained and cleared of mud and other obstructions.
- Areas of the site not disturbed by construction activities shall be maintained in their existing conditions.
- Earthworks, cuts, and fill slopes shall be properly maintained, in accordance with the construction specifications, including measures such as installation of drains, and use of plant cover.
- To avoid sediment-laden runoff that could adversely impact watercourses, install sediment control structures where needed to slow or redirect runoff and trap sediment until vegetation is established. Sediment control structures could include windrows of logging slash, berms, sediment catchment basins, straw bales, storm drain inlet protection systems, or brush fences.

7.1.6 Increased Waste Generation

- Contractor shall develop and implement a Waste Management Procedure / Plan specific for the road upgrading project, Landfill cell construction project and for the drainage systems respectively. The plan shall (i) identify what type of solid or liquid wastes and categories of wastes the rehabilitation works will generate; (ii) identify ways to reduce the volume of waste by reusing or recycling initiatives; (iii) use best available mechanisms, practices and technologies for waste collection and transportation to solid waste disposal sites.
- Contractor shall use nets and mats to trap debris and the trapped debris will then be disposed of at the authorized dump site.
- The developer should obtain all necessary waste disposal permits or licenses before the start of construction works.

- Take all necessary measures to reduce the potential for litter and negligent behaviour with regard to the disposal of refuse. At all places of work, the developer shall provide litter bins, containers and refuse collection facilities.
- Solid waste may be temporarily stored on site in a designated area approved by the construction supervision consultant and relevant local authorities prior to collection and disposal through a licensed waste collector.
- Cover all waste storage containers, to be tipping-proof, weatherproof and scavenger- proof.
- No burning, on-site burying or dumping of solid waste shall occur.
- Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc. shall be collected and separated on-site from other waste sources for reuse, for use as fill, or for sale.
- If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the construction supervision consultant and included in the solid waste plan. Under no circumstances shall the developer dispose of any waste materials in environmentally sensitive areas, such as in areas of natural habitat or in watercourses.

7.1.7 Loss of Vegetation

- The developer shall prepare a Clearance, Re-vegetation and Restoration Management Plan for prior approval by the Construction Supervision Engineer, following relevant regulations. This plan shall be approved by the Construction Supervision Consultant and followed strictly by contractor. Areas to be cleared should be minimized as much as possible. Re-vegetation shall be done according to the plan specified by the Standard specifications for road works of 2000 section 5700 (Landscaping and Grassing) see Appendix VI.
- The developer shall remove topsoil from all areas where topsoil will be impacted by construction activities, including temporary activities such as storage and stockpiling, etc; the stripped topsoil shall be stockpiled in areas agreed with the Construction Supervision Consultant for later use in re-vegetation; it shall be adequately protected while it is stored.
- The application of chemicals for vegetation clearing is not permitted.
- Prohibit cutting of any tree unless explicitly authorized in above-referred plan.
- When needed, erect temporary protective fencing to effectively protect all trees before commencement of any works within the site.

7.1.8 Damage/relocation of Public Infrastructure and loss of access to Public Services

- PMO-RALG/the developer should collaborate with utility provides such as TANESCO, KUWASA and TTCL and estimate the expected extent of damage to existing infrastructures and/or costs for provision of alternative services during the interruption.
- With regard to planned and unplanned interruptions to water, communication and electricity, the developer must undertake prior consultation and

contingency planning with local authorities about the consequences of a particular service failure or disconnection
- Coordinate with relevant utility providers to establish appropriate construction schedules.
- Provide information to affected households on work schedules as well as planned disruptions at least 5 days in advance.
- Ensure alternative water supply to affected residents in the event of disruptions lasting more than one day.
- Report any damages to existing utility systems of cable to authorities concerned; make sure they are repaired as soon as possible.

7.1.9 Worker's and Public Safety risk

- The developer shall comply with all Tanzanian regulations on Occupation Health and Safety Act, 2003. Further, the developer should do the following:
- Prepare and implement action plan to cope with risks and emergencies
- Train workers in occupational health and safety regulations.
- Ensure that workers wear / use appropriate personal protective equipment (PPE), such as safety glasses, ear pieces (noise protection ear muffs), face shields, hard hats, safety shoes, etc.
- During demolition of existing infrastructure, workers and the general public must be protected from falling debris by measures such as warning signs, chutes, traffic control, barriers and restricting access.
- Install fences, barriers, warning/prohibition signs around construction sites with potential dangers to the public.
- Provide safety measures through installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risks to the public.
- Remove hazardous conditions on construction sites that cannot be controlled effectively with access restrictions, such as covering small openings and ensuring means of escape from larger openings, such as trenches or open excavations.
- Ensure that moving equipment is fitted with audible back-up alarms.
- When work is done in confined spaces, such as deep excavation (trenches) use dewatering, adequate side-wall supports (shoring) and slope gradients that minimize the risks of collapse, entrapment or drowning.
- Implement good housekeeping practices on site, such as sorting and placing loose construction materials and debris in established areas away from footpaths.

7.1.10 Lacking or slow restoration of areas impacted by construction

- Restore cleared areas such as borrow pits which are no longer in use, disposal areas, site facilities, workers' camps, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works; use landscaping, adequate drainage and re-vegetation.

- Start re-vegetation at the earliest opportunity, and select appropriate local native plant species for the re-planting and restoration of the natural landscape.
- Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion.
- Landscape all areas affected by construction and undertake any necessary remedial works without delay.
- Plant trees on exposed land and on slopes to prevent or reduce land slippage or collapse and keep slopes stable.
- Remove any soil contaminated with chemicals or hazardous substances and transport it to waste disposal areas for burial.
- Restore all damages to road and bridges caused by project activities.

7.1.11 Overburdened local authorities

- Maintain open communications with the local government and concerned communities; the developer shall coordinate with local authorities (leaders of local wards or communes, leaders of villages) the agreed schedules of construction activities at areas nearby sensitive places or at sensitive times (e.g., religious festival days).
- Copies of the ESMPs and of other relevant environmental and social safeguard documents in Tanzanian shall be made available to local communities and to workers at the site.
- The loss of amenities during the construction process is often an unavoidable source of inconvenience to users in sensitive areas. However, early consultation with those affected, provides an opportunity to investigate and implement alternatives.
- Disseminate project information to affected parties (for example local authority, enterprises and affected households, etc.) through community meetings before construction starts;
- Provide a community relations contact from whom interested parties can receive information on site activities, project status and project implementation results;
- Provide all information, especially technical findings, in a language that is understandable to the general public and in a form that is useful to interested citizens and elected officials through the preparation of fact sheets and news releases, when major findings become available during project phase;
- Monitor community concerns and information requirements as the project progresses;
- Inform local residents about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition, as appropriate;
- Provide technical documents and drawings to affected communities, especially a sketch of the construction area and a copy of the ESMP for the construction site;
- Notification boards shall be erected at all construction sites providing information about the project, as well as the contact information of the site

managers, environmental staff, and health and safety staff. Telephone numbers and other contact information must be provided so that any affected people have the channel to voice their concerns and suggestions.

7.1.12 Increased spread of Social Illnesses

- Since construction camps will attract many job seekers and trade mongers, the contractor shall enforce a code of conduct in the camp to encourage respect for the local community and to maintain cleanliness of the camp at all times.
- The contractor shall deploy locally available labour to reduce risk of spreading of communicable diseases especially STD.
- A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on minimizing social illnesses such as effects of illicit drugs and HIV/AIDS, which have become a national disaster.
- In order to prevent more HIV/AIDS infection, during the implementation phase, the project shall include information education and communication component (IEC) in its budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.

7.1.13 Loss of definite materials and land degradation

- Construction materials shall be fetched from the existing sites/sources
- Where construction materials such as gravel and stones are to be obtained from people's lands, the material shall be purchased and this will be officially negotiated with people and/or Local government in order to avoid conflicts. The contractor may be compelled to pay a fee to the people and/or Local government.
- Potential long term environmental impacts of borrow pits and quarry sites relate to the way they are left once the resource has been extracted.
- In this case, all borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the construction. Pits shall not be left with steep or vertical sides.
- The topsoil shall be stock piled for later use in reinstating the pit. Shallow slopes will encourage rapid re-vegetation thus preventing erosion.
- Significance to Kigoma region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.

7.2 Mitigation Measures for Impacts during Operation Phase (All Sub-projects)

Enhancement of positive Impacts

All the identified positive impacts depend on proper management of the proposed facilities. If the facilities are not well operated, the community will not be able to

benefit from collected revenue, employment opportunities, area accessibility and so forth. The developer shall create awareness on the operation and functions of these facilities before the operation phase.

7.2.1 Improvements community life and services in general

- The developer shall ensure periodic maintenance of all facilitates in order to have sustainable projects.
- The local community shall be involved in Operation and maintenance of the proposed investment subprojects. This will ensure a sense ownership throughout the life of the project.

7.2.2Reduction of floods, erosion and siltation; and improved air quality

- The developer shall ensure that the roads and drainage system receive regular maintenance and cleaning.
- Soils and solid waste removed from drainage systems should be immediately removed. No waste shall be left over the drains sides, as these tend to fall back into the drains eventually.
- The road shall cleaned regularly to discourage dust accumulation and dispersion

7.2.3 Improvement to Solid Waste Management in Kigoma – Ujiji Municipality

- The prepared Landfill Operational Manual shall be strictly followed and updated to as required, to ensure best performance and protection of the environment.
- Regular monitoring of leachate in leachate ponds and of ground water quality shall be done, and preventive actions taken as required.

Mitigation for Negative Impacts (All projects)

7.2.4 Interference to local hydrology

- Storm water collected/diverged at construction sites shall be recycled back to the natural paths where possible
- Storm water collected at the landfill shall be collected in existing storm water collection ponds.

7.2.5 Risk of ground water pollution by landfill leachate

- All surface run-offs shall be routed away from the site to prevent additional of water into the landfill, and also prevent pollution of the runoff, which ultimately feeds into lake Tanganyika

- The landfill shall be lined with synthetic liners to intercept leachate, and provided with leachate collection pipes, that will drain the leachate to treatment ponds.
- The construction of the landfill shall include construction properly designed leachate treatment ponds, which shall treat the collected leachate on site.
- Landfill waste shall be covered after each fill and at the end of the day be provided with a final cover. This shall prevent waste scattering and also prevent rodents and flies from feeding on the waste materials.
- The landfill site shall be fenced to prevent scattering wind-blown waste materials.

7.2.6 Risks of explosions and fire hazards at the landfill

- Education to workers on fire hazards prevention and on proper use of fire extinguishers
- Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately.
- Workers shall be provided with protective gears.
- Activities such as cooking and cigarette smoking in the landfill shall be prohibited.

7.2.7 Occupational Health effects to landfill workers

- The developer shall follow the requirements of the Occupation Health and Safety Act, 2003
- The landfill workers shall be provided with protective gears such as masks, gloves, boots etc.
- Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately.
- The landfill site is provided with facilities such toilets, clean and safe water, proper dining area etc to protect their health.

7.2.8 Public health problems due to pests and birds

- Pests: The waste should be well compacted and covered, and, where rain water would tend to collect, filling depressions to eliminate breeding sites.
- Rats and other rodents: Covering the waste daily, properly compacting it, and filling the site to shed water will eliminate the three items rodents need to survive.
- Birds: Noise production, distress calls, and use of captive birds of prey shall be used to control birds

7.2.9 Road Accidents (Rusimbi Road)

- Design of Rusimbi road has considered installation of proper road signs and regular inspections for their presence

- Road accidents shall be reduced by provision of pedestrian lanes/walkway and street lights.
- Measures shall include installation of speed control devices like humps

8.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Introduction

The Environmental and Social Management Plan (ESMP) presents the implementation schedule for the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. The engineering designs have already included some of the mitigation measures recommended in this report. Additional recommendations are provided in the ESMP to enable the proposed facilities become more environmental friendly.

8.1 Institutional Structure for Environmental and Social Management

The Project Team in Kigoma -Ujiji is responsible for project implementation including environmental and social management requirements. PMO - RALG is to provide overall coordination and technical support to the Project Team including necessary link with national authorities (i.e. NEMC, MLHHSD). The approved ESIA report is fed back to Kigoma - Ujiji Municipal Council to guide implementation and monitoring by the Council Teams, EMOs, Construction supervision Consultants and Contractors.

8.2 Implementation procedure of the ESMP

During implementation the LGA Project Team will be responsible for:

- Ensuring that compensations for lost land rights and properties (if applicable to the sub-project) are implemented and completed before the commencement of any construction works.
- Ensuring that the implementation of the sub-project ESMP is part of the Contractor's contractual obligations. The LGA procurement section will supervise the tendering process for all service providers.
- Ensuring that the ESMP is implemented and approval conditions are observed during the mobilization, construction and operation of the sub-project.

If the project reaches a stage of decommissioning, the LGA Project Team shall prepare a decommissioning plan which will include environmental and social issues highlighted in the ESMP.

8.3 Environmental and Social Costs

The principal environmental and social cost includes the cost for implementing the mitigation measures proposed and that for carrying out monitoring of specific environmental and social parameters. The estimated costs are to be included in the Contractor's BOQ. Additional costs for implementing environmental and social management measures have been estimated at USD 6,000.00 annually as described in Table 8.1.

Table 8.1: Environmental and Social Management Plan for the Proposed Construction of Rusimbi Road

Environmental And Social Impacts	**Mitigation Measure**	**Responsible Institution**	**Time Frame**	**Estimated Cost(Usd)**
			Pre -Construction and Construction Phase	
1. Risk of water and soil pollution	▪ The developer is responsible for compliance with the relevant Tanzanian legislation relevant to wastewater discharges into water courses. ▪ Before the start of construction, the developer should obtain all necessary wastewater disposal permits/licenses and/or finalize all necessary wastewater disposal contracts. ▪ Portable or constructed toilets shall be provided on construction sites for use by the construction force. ▪ Wastewater from toilets, kitchens, showers, sinks, etc. shall be discharged into septic tanks systems for removal from construction sites. ▪ The developer should use techniques such as berms or flow diversion during construction to limit the exposure of disturbed sediments to moving water	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	6,000.00
2. Noise, vibration and air pollution	▪ The developer is responsible for compliance with the relevant Tanzanian legislations with respect to noise and vibration. ▪ When needed, the developer should implement measures to reduce noise to acceptable levels; this should include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas. ▪ The developer should consider minimizing activity of heavy vehicle traffic or noisy material processing facilities near residential areas. ▪ The developer and contractor should schedule activities in	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	2,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	consultation with local communities.			
3. Accelerated Soil Erosion	▪ The developer shall follow the detailed drainage designs included in the construction plans, intended to prevent storm water from causing local Ensure drainage system is always well maintained and cleared of mud and other obstructions. ▪ Areas of the site not disturbed by construction activities shall be maintained in their existing conditions. ▪ Earthworks, cuts, and fill slopes shall be properly maintained, in accordance with the construction specifications, including measures such as installation of drains, and use of plant cover.	PMO-RALG, K-Ujiji MC and Contractor	Pre Construction and construction Phase	5,000.00
4. Increased generation of solid waste	▪ Contractor shall develop and implement a Waste Management Procedure / Plan specific for each subproject. The plan shall (i) identify what type of solid or liquid wastes and categories of wastes the rehabilitation works will generate; (ii) identify ways to reduce the volume of waste by reusing or recycling initiatives; (iii) use best available mechanisms, practices and technologies for waste collection and transportation to solid waste disposal sites. ▪ The developer should obtain all necessary waste disposal permits or licenses before the start of construction works. ▪ Contractor shall use nets and mats to trap debris and the trapped debris will then be disposed of at the authorized dump site. ▪ Take all necessary measures to reduce the potential for litter and negligent behaviour with regard to the disposal of refuse. At all places of work, the developer shall provide litter bins,	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	2,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	containers and refuse collection facilities. ▪ Solid waste may be temporarily stored on site in a designated area approved by the construction supervision consultant and relevant local authorities prior to collection and disposal through a licensed waste collector. ▪ The waste storage containers shall be tipping-proof, weatherproof and scavenger- proof. ▪ No burning, on-site burying or dumping of solid waste shall occur. ▪ Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc. shall be collected and separated on-site from other waste sources for reuse, for use as fill, or for sale. ▪ If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the construction supervision consultant and included in the solid waste management plan. Under no circumstances shall the developer dispose of any waste materials in environmentally sensitive areas, such as in areas of natural habitat or in watercourses.			
5. Damage/relocation of Public Infrastructure and loss of access to Public Services	▪ PMO-RALG/the developer should collaborate with utility provides such as TANESCO, DAWASCO and TTCL and estimate the expected extent of damage to existing infrastructures and/or costs for provision of alternative services during the interruption. ▪ With regard to planned and unplanned interruptions to water, communication and electricity, the developer must	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	1,500.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	undertake prior consultation and contingency planning with local authorities about the consequences of a particular service failure or disconnection ▪ Coordinate with relevant utility providers to establish appropriate construction schedules. ▪ Provide information to affected households on work schedules as well as planned disruptions at least 5 days in advance. ▪ Ensure alternative water supply to affected residents in the event of disruptions lasting more than one day. ▪ Report any damages to existing utility systems to authorities concerned; make sure they are repaired as soon as possible.			
6. Worker's and Public Safety risk	▪ The developer should comply with all Tanzanian regulations on Occupation Health and Safety Act, 2003. Further, the developer should do the following: ▪ Prepare and implement action plan to cope with risks and emergencies ▪ Train workers in occupational health and safety regulations. ▪ Ensure that workers wear / use appropriate personal protective equipment (PPE), such as safety glasses, ear pieces (noise protection ear muffs), face shields, hard hats, safety shoes, etc. ▪ During demolition of existing infrastructure, workers and the general public must be protected from falling debris by measures such as warning signs, chutes, traffic control, barriers and restricting access. ▪ Install fences, barriers, warning/prohibition signs around	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	3,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	construction sites with potential dangers to the public. ▪ Provide safety measures through installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risks to the public. ▪ Remove hazardous conditions on construction sites that cannot be controlled effectively with access restrictions, such as covering small openings and ensuring means of escape from larger openings, such as trenches or open excavations. ▪ Ensure that moving equipment is fitted with audible back-up alarms. ▪ When work is done in confined spaces, such as deep excavation (trenches) use dewatering, adequate side-wall supports (shoring) and slope gradients that minimize the risks of collapse, entrapment or drowning. ▪ Implement good housekeeping practices on site.			
7. Lacking or slow restoration of areas impacted by construction	▪ Restore cleared areas such as borrow pits which are no longer in use, disposal areas, site facilities, workers' camps, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works; use landscaping, adequate drainage and re-vegetation. ▪ Start re-vegetation at the earliest opportunity, and select appropriate local native plant species for the re-planting and restoration of the natural landscape. ▪ Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion. ▪ Landscape all areas affected by construction and undertake	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase and possibly operational phase	1,700.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	any necessary remedial works without delay. ▪ Plant trees on exposed land and on slopes to prevent or reduce land slippage or collapse and keep slopes stable. ▪ Remove any soil contaminated with chemicals or hazardous substances and transport it to waste disposal areas for burial. ▪ Restore all damages to road and bridges caused by project activities.			
8. Overburdened local authorities	▪ Maintain open communications with the local government and concerned communities; the developer shall coordinate with local authorities (leaders of local wards or communes, leaders of villages) the agreed schedules of construction activities at areas nearby sensitive places or at sensitive times (e.g., religious festival days). ▪ Copies of the ESMPs and of other relevant environmental and social safeguard documents in Tanzanian shall be made available to local communities and to workers at the site. ▪ The loss of amenities during the construction process is often an unavoidable source of inconvenience to users in sensitive areas. However, early consultation with those affected, provides an opportunity to investigate and implement alternatives. ▪ Disseminate project information to affected parties (for example local authority, enterprises and affected households, etc.) through community meetings before construction starts; ▪ Provide a community relations contact from whom interested parties can receive information on site activities, project	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase and possibly operational phase	9,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	status and project implementation results; ▪ Provide all information, especially technical findings, in a language that is understandable to the general public and in a form that is useful to interested citizens and elected officials through the preparation of fact sheets and news releases, when major findings become available during project phase; ▪ Monitor community concerns and information requirements as the project progresses; ▪ Inform local residents about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition, as appropriate; ▪ Provide technical documents and drawings to affected communities, especially a sketch of the construction area and a copy of the ESMP for the construction site; ▪ Notification boards shall be erected at all construction sites providing information about the project, as well as the contact information of the site managers, environmental staff, and health and safety staff. Telephone numbers and other contact information must be provided so that any affected people have the channel to voice their concerns and suggestions. ▪			
9. Increased spread of HIV/AIDS	▪ Enforce a code of conduct in camp sites to encourage respect for the local community and to maintain cleanliness of the camp at all times.	PMO-RALG, K-Ujiji MC and Contractor	Construction and Operatio	14,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	▪ Deploy locally available labour to reduce risk of spreading of communicable diseases (especially STD). ▪ A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on HIV/AIDS, which has become a national disaster. ▪ Include information education and communication component (IEC) in the project budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.		n Phase	
10. Loss of definite materials and land degradation	▪ Construction materials should be fetched from the existing sites/sources ▪ Where construction materials such as gravel and stones are to be obtained from people's lands, the material shall be purchased and this will be officially negotiated with people and/or Local government in order to avoid conflicts. The contractor may be compelled to pay a fee to the people and/or Local government. ▪ Potential long term environmental impacts of borrow pits and quarry sites relate to the way they are left once the resource has been extracted. ▪ In this case, all borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the construction. Pits shall not be left with steep or vertical sides. ▪ The topsoil shall be stock piled for later use in reinstating the pit. Shallow slopes will encourage rapid re-vegetation thus preventing erosion.	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	9,400.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	▪ Significance to Kigoma region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.			
				Operational Phase
11. Improved Transport and Economy of the People	▪ Ensure periodic maintenance of all facilitates in order to have sustainable projects. ▪ The local community shall be involved in Operation and maintenance of the proposed investment subprojects.	K-Ujiji MC	Operation Phase	N/A
12. Reduction of floods, erosion and siltation; and improved air quality	▪ Ensure that the roads and drainage system receive regular maintenance and cleaning. ▪ Soils and solid waste removed from drainage systems should be immediately removed. No waste shall be left over the drains sides, as these tend to fall back into the drains eventually. ▪ The road shall cleaned regularly to discourage dust accumulation and dispersion	WEOs and K-Ujiji MC	Operation Phase	1,000.00
13. Improvement to solid waste management in Kigoma Municipality	▪ The prepared Landfill Operational Manual shall be strictly followed and updated to as required, to ensure best performance and protection of the environment. ▪ Regular monitoring of leachate in leachate ponds and of ground water quality shall be done, and preventive actions taken as required.	K-Ujiji MC	Operation Phase	2,500.00
1.4. Risk of ground water pollution by landfill leachate	▪ All surface run-offs shall be routed away from the site to prevent additional of water into the landfill, and also prevent pollution of the runoff, which ultimately feeds into lake	K-Ujiji MC	Operation Phase	13,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	Tanganyika ▪ The landfill shall be lined with synthetic liners to intercept leachate, and provided with leachate collection pipes, that will drain the leachate to treatment ponds. ▪ The construction of the landfill shall include construction properly designed leachate treatment ponds, which shall treat the collected leachate on site. ▪ Landfill waste shall be covered after each fill and at the end of the day be provided with a final cover. This shall prevent waste scattering and also prevent rodents and flies from feeding on the waste materials. ▪ The landfill site shall be fenced to prevent scattering wind-blown waste materials.			
15. Risks of explosions and fire hazards at the landfill	▪ Education to workers on fire hazards prevention and on proper use of fire extinguishers ▪ Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately. ▪ Workers shall be provided with protective gears. ▪ Activities such as cooking and cigarette smoking in the landfill shall be prohibited.	K-Ujiji MC	Operation Phase	4,500.00
16. Occupational Health effects to landfill workers	▪ The developer shall follow the requirements of the Occupation Health and Safety Act, 2003 ▪ The landfill workers shall be provided with protective gears such as masks, gloves, boots etc. ▪ Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately. ▪ The landfill site is provided with facilities such toilets, clean	K-Ujiji MC	Operation Phase	8,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(Usd)
	and safe water, proper dining area etc to protect their health.			
17. Public health problems due to pests and birds	▪ Pests: The waste should be well compacted and covered, and, where rain water would tend to collect, filling depressions to eliminate breeding sites. ▪ Rats and other rodents: Covering the waste daily, properly compacting it, and filling the site to shed water will eliminate the three items rodents need to survive. ▪ Birds: Noise production, distress calls, and use of captive birds of prey shall be used to control birds	K-Ujiji MC	Operation Phase	6.000.00
18. Road Accidents (Rusimbi Road)	▪ Design of Rusimbi road has considered installation of proper road signs and regular inspections for their presence. ▪ Road accidents shall be reduced by provision of pedestrian lanes/walkway and street lights. ▪ Measures shall include installation of speed control devices like humps	Rusimbi WEO and K-Ujiji MC	Operation Phase	2,500.00 129,600
			TOTAL	**91,100.00**

Table

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
Pre -Construction and Construction Phase				
12. Risk of water	▪ The developer is responsible for compliance with the relevant	PMO-RALG,	Construc	6,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
and soil pollution	Tanzanian legislation relevant to wastewater discharges into water courses. ▪ Before the start of construction, the developer should obtain all necessary wastewater disposal permits/licenses and/or finalize all necessary wastewater disposal contracts. ▪ Portable or constructed toilets shall be provided on construction sites for use by the construction force. ▪ Wastewater from toilets, kitchens, showers, sinks, etc. shall be discharged into septic tanks systems for removal from construction sites. ▪ The developer should use techniques such as berms or flow diversion during construction to limit the exposure of disturbed sediments to moving water	K-Ujiji MC and Contractor	tion Phase	
13. Noise, vibration and air pollution	▪ The developer is responsible for compliance with the relevant Tanzanian legislations with respect to noise and vibration. ▪ When needed, the developer should implement measures to reduce noise to acceptable levels; this should include silencers, mufflers, acoustically dampened panels or placement of noisy machines in acoustically protected areas. ▪ The developer should consider minimizing activity of heavy vehicle traffic or noisy material processing facilities near residential areas. ▪ The developer and contractor should schedule activities in consultation with local communities.	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	2,000.00
14. Accelerated Soil Erosion	▪ The developer shall follow the detailed drainage designs included in the construction plans, intended to prevent storm water from causing local Ensure drainage system is always	PMO-RALG, K-Ujiji MC and Contractor	Pre Construction and	5,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	well maintained and cleared of mud and other obstructions. ▪ Areas of the site not disturbed by construction activities shall be maintained in their existing conditions. ▪ Earthworks, cuts, and fill slopes shall be properly maintained, in accordance with the construction specifications, including measures such as installation of drains, and use of plant cover.		construction Phase	
15. Increased generation of solid waste	▪ Contractor shall develop and implement a Waste Management Procedure / Plan specific for each subproject. The plan shall (i) identify what type of solid or liquid wastes and categories of wastes the rehabilitation works will generate; (ii) identify ways to reduce the volume of waste by reusing or recycling initiatives; (iii) use best available mechanisms, practices and technologies for waste collection and transportation to solid waste disposal sites. ▪ The developer should obtain all necessary waste disposal permits or licenses before the start of construction works. ▪ Contractor shall use nets and mats to trap debris and the trapped debris will then be disposed of at the authorized dump site. ▪ Take all necessary measures to reduce the potential for litter and negligent behaviour with regard to the disposal of refuse. At all places of work, the developer shall provide litter bins, containers and refuse collection facilities. ▪ Solid waste may be temporarily stored on site in a designated area approved by the construction supervision consultant and relevant local authorities prior to collection and disposal	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	2,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	through a licensed waste collector. ▪ The waste storage containers shall be tipping-proof, weatherproof and scavenger- proof. ▪ No burning, on-site burying or dumping of solid waste shall occur. ▪ Recyclable materials such as wooden plates for trench works, steel, scaffolding material, site holding, packaging material, etc. shall be collected and separated on-site from other waste sources for reuse, for use as fill, or for sale. ▪ If not removed off site, solid waste or construction debris shall be disposed of only at sites identified and approved by the construction supervision consultant and included in the solid waste management plan. Under no circumstances shall the developer dispose of any waste materials in environmentally sensitive areas, such as in areas of natural habitat or in watercourses.			
16. Damage/relocation of Public Infrastructure and loss of access to Public Services	▪ PMO-RALG/the developer should collaborate with utility provides such as TANESCO, DAWASCO and TTCL and estimate the expected extent of damage to existing infrastructures and/or costs for provision of alternative services during the interruption. ▪ With regard to planned and unplanned interruptions to water, communication and electricity, the developer must undertake prior consultation and contingency planning with local authorities about the consequences of a particular service failure or disconnection ▪ Coordinate with relevant utility providers to establish	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	1,500.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	appropriate construction schedules. ▪ Provide information to affected households on work schedules as well as planned disruptions at least 5 days in advance. ▪ Ensure alternative water supply to affected residents in the event of disruptions lasting more than one day. ▪ Report any damages to existing utility systems to authorities concerned; make sure they are repaired as soon as possible.			
17. Worker's and Public Safety risk	▪ The developer should comply with all Tanzanian regulations on Occupation Health and Safety Act, 2003. Further, the developer should do the following: ▪ Prepare and implement action plan to cope with risks and emergencies ▪ Train workers in occupational health and safety regulations. ▪ Ensure that workers wear / use appropriate personal protective equipment (PPE), such as safety glasses, ear pieces (noise protection ear muffs), face shields, hard hats, safety shoes, etc. ▪ During demolition of existing infrastructure, workers and the general public must be protected from falling debris by measures such as warning signs, chutes, traffic control, barriers and restricting access. ▪ Install fences, barriers, warning/prohibition signs around construction sites with potential dangers to the public. ▪ Provide safety measures through installation of fences, barriers warning signs, lighting system against traffic accidents as well as other risks to the public.	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	3,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	▪ Remove hazardous conditions on construction sites that cannot be controlled effectively with access restrictions, such as covering small openings and ensuring means of escape from larger openings, such as trenches or open excavations. ▪ Ensure that moving equipment is fitted with audible back-up alarms. ▪ When work is done in confined spaces, such as deep excavation (trenches) use dewatering, adequate side-wall supports (shoring) and slope gradients that minimize the risks of collapse, entrapment or drowning. ▪ Implement good housekeeping practices on site.			
18. Lacking or slow restoration of areas impacted by construction	▪ Restore cleared areas such as borrow pits which are no longer in use, disposal areas, site facilities, workers' camps, stockpiles areas, working platforms and any areas temporarily occupied during construction of the project works; use landscaping, adequate drainage and re-vegetation. ▪ Start re-vegetation at the earliest opportunity, and select appropriate local native plant species for the re-planting and restoration of the natural landscape. ▪ Spoil heaps and excavated slopes shall be re-profiled to stable batters, and grassed to prevent erosion. ▪ Landscape all areas affected by construction and undertake any necessary remedial works without delay. ▪ Plant trees on exposed land and on slopes to prevent or reduce land slippage or collapse and keep slopes stable. ▪ Remove any soil contaminated with chemicals or hazardous	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase and possibly operational phase	1,700.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	substances and transport it to waste disposal areas for burial. ▪ Restore all damages to road and bridges caused by project activities.			
19. Overburdened local authorities	▪ Maintain open communications with the local government and concerned communities; the developer shall coordinate with local authorities (leaders of local wards or communes, leaders of villages) the agreed schedules of construction activities at areas nearby sensitive places or at sensitive times (e.g., religious festival days). ▪ Copies of the ESMPs and of other relevant environmental safeguard documents in Tanzanian shall be made available to local communities and to workers at the site. ▪ The loss of amenities during the construction process is often an unavoidable source of inconvenience to users in sensitive areas. However, early consultation with those affected, provides an opportunity to investigate and implement alternatives. ▪ Disseminate project information to affected parties (for example local authority, enterprises and affected households, etc.) through community meetings before construction starts; ▪ Provide a community relations contact from whom interested parties can receive information on site activities, project status and project implementation results; ▪ Provide all information, especially technical findings, in a language that is understandable to the general public and in a form that is useful to interested citizens and elected	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase and possibly operational phase	9,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	officials through the preparation of fact sheets and news releases, when major findings become available during project phase; ▪ Monitor community concerns and information requirements as the project progresses; ▪ Inform local residents about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition, as appropriate; ▪ Provide technical documents and drawings to affected communities, especially a sketch of the construction area and a copy of the ESMP for the construction site; ▪ Notification boards shall be erected at all construction sites providing information about the project, as well as the contact information of the site managers, environmental staff, and health and safety staff. Telephone numbers and other contact information must be provided so that any affected people have the channel to voice their concerns and suggestions. ▪			
20. Increased spread of HIV/AIDS	▪ Enforce a code of conduct in camp sites to encourage respect for the local community and to maintain cleanliness of the camp at all times. ▪ Deploy locally available labour to reduce risk of spreading of communicable diseases (especially STD). ▪ A safety, health and environment induction course shall be conducted to all workers, putting more emphasis on	PMO-RALG, K-Ujiji MC and Contractor	Construction and Operation Phase	14,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	HIV/AIDS, which has become a national disaster. ▪ Include information education and communication component (IEC) in the project budget. This will help to raise more awareness on HIV/AIDS, and means to suppress its incidence.			
21. Loss of definite materials and land degradation	▪ Construction materials should be fetched from the existing sites/sources ▪ Where construction materials such as gravel and stones are to be obtained from people's lands, the material shall be purchased and this will be officially negotiated with people and/or Local government in order to avoid conflicts. The contractor may be compelled to pay a fee to the people and/or Local government. ▪ Potential long term environmental impacts of borrow pits and quarry sites relate to the way they are left once the resource has been extracted. ▪ In this case, all borrow pits and quarries shall be rehabilitated and proper landscaping done after completion of the construction. Pits shall not be left with steep or vertical sides. ▪ The topsoil shall be stock piled for later use in reinstating the pit. Shallow slopes will encourage rapid re-vegetation thus preventing erosion. ▪ Significance to Kigoma region of the depletion of the material assets is not considered to be high as deposits throughout the remainder of the region will not be significantly affected by this project and they remain available for other projects.	PMO-RALG, K-Ujiji MC and Contractor	Construction Phase	9,400.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
Operational Phase				
22. Improved Transport and Economy of the People	▪ Ensure periodic maintenance of all facilitates in order to have sustainable projects. ▪ The local community shall be involved in Operation and maintenance of the proposed investment subprojects.	K-Ujiji MC	Operation Phase	N/A
12. Reduction of floods, erosion and siltation; and improved air quality	▪ Ensure that the roads and drainage system receive regular maintenance and cleaning. ▪ Soils and solid waste removed from drainage systems should be immediately removed. No waste shall be left over the drains sides, as these tend to fall back into the drains eventually. ▪ The road shall cleaned regularly to discourage dust accumulation and dispersion	WEOs and K-Ujiji MC	Operation Phase	1,000.00
13. Improvement to solid waste management in Kigoma Municipality	▪ The prepared Landfill Operational Manual shall be strictly followed and updated to as required, to ensure best performance and protection of the environment. ▪ Regular monitoring of leachate in leachate ponds and of ground water quality shall be done, and preventive actions taken as required.	K-Ujiji MC	Operation Phase	2,500.00
1.4. Risk of ground water pollution by landfill leachate	▪ All surface run-offs shall be routed away from the site to prevent additional of water into the landfill, and also prevent pollution of the runoff, which ultimately feeds into lake Tanganyika ▪ The landfill shall be lined with synthetic liners to intercept leachate, and provided with leachate collection pipes, that will drain the leachate to treatment ponds.	K-Ujiji MC	Operation Phase	13,000.00

Environmental And Social Impacts	Mitigation Measure	Responsible Institution	Time Frame	Estimated Cost(USD)
	▪ The construction of the landfill shall include construction properly designed leachate treatment ponds, which shall treat the collected leachate on site. ▪ Landfill waste shall be covered after each fill and at the end of the day be provided with a final cover. This shall prevent waste scattering and also prevent rodents and flies from feeding on the waste materials. ▪ The landfill site shall be fenced to prevent scattering wind-blown waste materials.			
15. Risks of explosions and fire hazards at the landfill	▪ Education to workers on fire hazards prevention and on proper use of fire extinguishers ▪ Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately. ▪ Workers shall be provided with protective gears. ▪ Activities such as cooking and cigarette smoking in the landfill shall be prohibited.	K-Ujiji MC	Operation Phase	4,500.00
16. Occupational Health effects to landfill workers	▪ The developer shall follow the requirements of the Occupation Health and Safety Act, 2003 ▪ The landfill workers shall be provided with protective gears such as masks, gloves, boots etc. ▪ Provision of well serviced fire extinguishers, and any detected fire shall be put out immediately. ▪ The landfill site is provided with facilities such toilets, clean and safe water, proper dining area etc to protect their health.	K-Ujiji MC	Operation Phase	8,000.00
17. Public health problems due to pests and birds	▪ Pests: The waste should be well compacted and covered, and, where rain water would tend to collect, filling depressions to eliminate breeding sites.	K-Ujiji MC	Operation Phase	6.000.00

Environmental And Social Impacts	**Mitigation Measure**	**Responsible Institution**	**Time Frame**	**Estimated Cost(USD)**
	▪ Rats and other rodents: Covering the waste daily, properly compacting it, and filling the site to shed water will eliminate the three items rodents need to survive. ▪ Birds: Noise production, distress calls, and use of captive birds of prey shall be used to control birds			
18. Road Accidents (Rusimbi Road)	▪ Design of Rusimbi road has considered installation of proper road signs and regular inspections for their presence. ▪ Road accidents shall be reduced by provision of pedestrian lanes/walkway and street lights. ▪ Measures shall include installation of speed control devices like humps	Rusimbi WEO and K-Ujiji MC	Operation Phase	2,500.00 129,600
TOTAL				**91,100.00**

8.4 Implementation of the ESMP

The Kigoma-Ujiji Municipal Council is committed to do the following in order to facilitate effective implementation of the ESMP.

(a) establish an Environmental and Social Team (EST) responsible for ensuring the timely implementation of the ESMP, including monitoring, reporting, and capacity building related to safeguards;

(b) assign the Construction Supervision Consultant (CSC) to be responsible for supervision of the contractor's safeguard performance as part of the construction contract and this requirement will be included in the CSC terms of reference (ToR); and

(c) hire qualified national consultants as the Independent Environmental Management Consultant (IEMC) to assist the EST in performing these tasks.

The Municipal will be responsible for implementation of mitigation measures during the operation stage of the project. The Municipality will also ensure adequate budgets are provided in the planning stage. The PMO RALG will provide the overall policy guidance and oversight for project implementation, including the ESMP. More details on organization, roles and responsibilities for the ESMP implementation and the monitoring program are described further in Chapter 9.

9.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

9.1 Environmental and Social Monitoring

Monitoring of the anticipated environmental and social impacts in the receiving environments is important. It helps in determining the effects of the project activities on the environments enhancing understanding of cause effect relationships between human activities and environmental changes, and verifies the accuracy of prediction about the environmental impacts. It ensures compliance with regulatory measures and understanding the degree of implementation of ESMP and its effectiveness. The monitoring results are also used extensively during the environmental auditing.

The Tanzanian ESIA regulations require the developer to prepare and undertake monitoring plan and regular auditing. Monitoring is needed to check if and to what extent the impacts are mitigated, benefits enhanced and new problems addressed. Recommendations for monitoring have been included in the ESMP (Table 9.1). The monitoring also assigns responsibilities for monitoring activities. However, the divisional/ward/village environmental committees and municipal environmental committee will participate in the long-term daily monitoring of the project road especially during operation.

Monitoring Parameters

The selection of the parameters to be monitored is based on the high likelihood of occurrences of the selected parameters. Monitoring of these parameters will be done in various stages of the project as follows;

- *Pre construction stage* – Monitoring of the parameters at this stage is meant to establish the baseline information of the target parameters in the project area.
- *Construction stage* - Monitoring at this stage is meant to establish the pollution levels that arise from the construction activities.
- *Operation stage* - Monitoring at this stage is meant to check on the impacts that might arise as the result of normal use of the infrastructure.
- *Decommissioning* - Decommissioning is not anticipated in the foreseeable future. However, if this will happen, may entail change of use (functional changes) or demolition triggered by change of land use.

Table 9.1: Environmental and Social Monitoring Plan Rusimbi road and Bus Stands

	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (USD)
Pre-construction stage								
Air quality	SO_2	Once before the construction starts	Project sites	mg/kg (hourly)	Detector tubes	0.1	Kigoma-Ujiji MC and Contractor	500
	HC		Project sites	mg/l	HPLC			500
	NO_x		Project sites	µg/nm^3 (24 hrs)	Detector tubes	150		500
	TSP and PM_{10}		Project sites	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		500
	CO_2		Project sites	ppm (1hr)	Detector tubes	35		500
Noise Baseline	Noise level		Project site	dBA	Measurements			500
Water pollution	E-coli	Once before the construction work starts	Shallow wells and seasonal streams near the project sites	Counts/100mls	Lab Analysis (culture)	0	Kigoma-Ujiji MC and Contractor	500
	BOD			Mg/l	Lab Analysis (DOD kit)	300		400
	Nitrate			mg/l	Analysis (Spectrophotometer)	30		400
	Trace metals			mg/l	Analysis in AAS	0.05		400
	Sulphate			mg/l	Lab Analysis (Spectrophotometer)	600*		400
	Turbidity			NTU		35		100
	Hydrocarbons			Mg/l	Lab Analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		100
Construction stage								
Air Quality	SO_2	Once before the construction starts	Project sites	mg/kg (hourly)	Detector tubes	0.1	Kigoma-Ujiji MC and Contractor	500
	HC		Project sites	mg/l	HPLC			500
	NO_x		Project sites	µg/nm^3 (24 hrs)	Detector tubes	150		500
	TSP and PM_{10}		Project sites	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		500
	CO_2		Project site	ppm (1hr)	Detector tubes	35		500

	Parameters	**Monitoring frequency**	**Sampling Area**	**Measurement Units**	**Method**	**Target level/ Standard**	**Responsibility for monitoring**	**Annual costs estimates (USD)**
Noise pollution	Noise level	Once in a year	Project site	dBA	Measurements			1500
Water pollution	E-coli	Three times during construction	Shallow wells and seasonal streams near the project sites	Counts/100mls	Lab Analysis (culture)	0	Kigoma-Ujiji MC and Contractor	500
	BOD			Mg/l	Lab Analysis (DOD kit)	300		400
	Nitrate			mg/l	Analysis (Spectrophotometer)	30		400
	Trace metals			mg/l	Analysis in AAS	0.05		400
	Sulphate			mg/l	Lab Analysis (Spectrophotometer)	600*		400
	Turbidity			NTU		35		100
	Hydrocarbons			Mg/l	Lab Analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		100
Soil erosion		Three times (monthly)	project area	Level of erosions	Site inspection	_	Kigoma-Ujiji MC and Contractor	5000
Interference to local hydrology	Hydrometric	Once a month (during rainy season)	Seasonal streams and wells near the project sites	Flooding levels	Volumetric measurements	-	Kigoma-Ujiji MC and Contractor	4,000
Vibration	Vibration levels	Three times a year	Project sites and all borrow pits	Number	Vibration meter	-	Kigoma-Ujiji MC and Contractor	1500
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Kigoma-Ujiji MC and Contractor	N/A
Worker's and Public Safety risk	Number and type of safety gears.	Once a year	Project site	Number of safety measures provided	Records, injuries and inspection	-	Kigoma-Ujiji MC and Contractor	3000

	Parameters	**Monitoring frequency**	**Sampling Area**	**Measurement Units**	**Method**	**Target level/ Standard**	**Responsibility for monitoring**	**Annual costs estimates (USD)**
Relocation of Infrastructure and loss of access Services	Availability of access and services	Three times during construction	Project site	Service availability -		Contractor	Kigoma-Ujiji MC and	1000
Dust	Water sprinkling	Twice a week	Project site	Frequency of water sprinkling	Inquiries and observation	Minimum dust emission	Kigoma-Ujiji MC and Contractor	1000
Operation stage								
Air Quality	SO_2	Twice in the first year of operation	Project sites	mg/kg (hourly)	Detector tubes	0.1	Kigoma-Ujiji MC and Contractor	500
	NO_x		Project sites	µg/nm^3 (24 hrs)	Detector tubes	150		500
	TSP and PM_{10}		Project sites	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		500
Water pollution	E-coli	Twice in the first year of operation	Shallow wells and seasonal streams near the project sites	Counts/100mls	Lab Analysis (culture)	0	Kigoma-Ujiji MC and Contractor	500
	BOD			Mg/l	Lab Analysis (DOD kit)	300		400
	Nitrate			mg/l	Analysis (Spectrophotometer)	30		400
	Trace metals			mg/l	Analysis in AAS	0.05		400
	Sulphate			mg/l	Lab Analysis (Spectrophotometer)	600*		400
	Turbidity			NTU		35		100
	Hydrocarbons			Mg/l	Lab Analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		100
Road Safety	Road accidents and availability of road signs	Three times in the first year of operation	Project site	Road signs and number of accidents	Records, inquiries and inspection	Zero accident and sufficient no of road	Kigoma-Ujiji MC	1500

	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (USD)
						signs		
Total monitoring costs								**33,200**

Table 9.2: Environmental and Social Monitoring Plan for Lubengera and NHC-Katubuka Drains

	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (USD)
Pre-construction and Construction stage								
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	WEOs and Contractor	N/A
Worker's and Public Safety risk	NOs. and type of safety gears.. Health and sanitation facilities	Once a year	Project site	Number of safety measures provided	Records, inquiries and inspection	-	NEMC Municipal Council/ Contractor	3000
Air pollution	SO_2	Once before the construction starts	Project sites	mg/kg (hourly)	Detector tubes	0.1	Kigoma-Ujiji MC and Contractor	500
	HC		Project sites	mg/l	HPLC			500
	NO_x		Project sites	µg/nm^3 (24 hrs)	Detector tubes	150		500
	TSP and PM_{10}		Project sites	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		500
	CO_2		Project site	ppm (1hr)	Detector tubes	35		500
Noise pollution	Noise level	Once in a year	Project site	dBA	Measurements			500
Water pollution	E-coli	Twice during construction	Receiving body (Lake Tanganyika)	Counts/100mls	Lab Analysis (culture)	0	Kigoma-Ujiji MC and	500
	BOD			Mg/l	Lab Analysis (DOD kit)	300		400
	Nitrate			mg/l	Analysis (Spectrophotometer)	30		400

	Trace metals			mg/l	Analysis in AAS	0.05	Contractor	400
	Sulphate			mg/l	Lab Analysis (Spectrophotometer)	600*		400
	Turbidity			NTU		35		100
	Hydrocarbons			Mg/l	Lab Analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		100
Soil erosion		Once in three month for construction period	project area	Level of erosions	Site inspection	_	Kigoma-Ujiji MC and Contractor	1000
Interference to local hydrology	Hydrometric	Once in a month during rainy season in the construction period	Seasonal streams and wells near the project sites	Flooding levels	Volumetric measurements	-	Kigoma-Ujiji MC and Contractor	800
Vibration	Vibration levels	Three times a year	Project sites and all borrow pits	Number	Vibration meter	-	Kigoma-Ujiji MC and Contractor	1000
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Kigoma-Ujiji MC and Contractor	N/A
Worker's and Public Safety risk	Number and type of safety gears.	Once a year	Project site	Number of safety measures provided	Records, injuries and inspection	-	Kigoma-Ujiji MC and Contractor	1000
Relocation of Infrastructure and loss of access to Services	Availability of access and services	Three times during construction	Project site	Service availability		-	Kigoma-Ujiji MC and Contractor	1000
Operation stage								
Waste disposal into storm drains	Storm water flow in the drains	Once before every rain season	Project site	Design water flow (m^3/s), siltation	Flow measurements Solidwaste/silt measurement	-	Kigoma-Ujiji MC	1200
Total monitoring costs								**14,900**

Table 9.3: Environmental and Social Monitoring Plan for the additional landfill cell

	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility for monitoring	Annual costs estimates (USD)
Pre Construction and Construction Phase								
Air quality	SO_2	Once before the construction starts	Project site	mg/kg (hourly)	Detector tubes	0.1	Kigoma-Ujiji MC and Contractor	500
	NO_x		Project site	µg/nm^3 (24 hrs)	Detector tubes	150		500
	PM_{10}		Project site	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		500
	CO_2		Project site	ppm (1hr)	Detector tubes	35		500
Noise Baseline	Noise level		Project site	dBA (equivalent)	Noise meter	55	Kigoma-Ujiji MC and Contractor	500
Ground and surface Water pollution	Trace metals	Once before the construction work starts	Shallow wells at Msimba area		Sampling and analysis (AAS)	0.05	Kigoma-Ujiji MC and Contractor	
	Nitrate			mg/l	Sampling and analysis (Spectrophotometer)	30		400
	BOD/COD			mg/l	BOD/COD kit			400
	Sulphate			mg/l	Sampling and analysis (Spectrophotometer)	600*		400
	Turbidity			NTU	Sampling and analysis (Spectrophotometer)	35		100
	Hydrocarbons			Mg/l	Sampling and analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		200
Soil erosion		Once in three month for construction period	Project area	Level of erosions	Site inspection	_	Kigoma-Ujiji MC and Contractor	1,000
Loss of Vegetation	Vegetation cover	Once before construction	Project site	Vegetation cover	Site inspection	-	Kigoma-Ujiji MC and Contractor	500
Interference to local hydrology	Hydrometric	Once in a month during rainy season	Project site	Flows around the landfill area	Volumetric measurements	-	Kigoma-Ujiji MC and Contractor	1,000
Vibration	Vibration	Twice a year	Project sites	Number	Vibration meter	-	Kigoma-Ujiji	1,000

	levels						MC and Contractor	
Employment opportunity	Percentage of local construction labourers	Three times a year	Project site	Number of local people employed in the project	Records, inquiries and observation	-	Kigoma-Ujiji MC and Contractor	N/A
Workers Safety and health risks	Number and type of safety equipment such as mask, helmet gloves and ear plugs. Health and sanitation facilities in camps.	Monthly	Project site	Number of safety measures provided	Records, inquiries and inspection	-	Kigoma-Ujiji MC and Contractor	900
Operation stage								
Air pollution	CH_4	Twice annually	Project site	µg/m^3	Detector tubes		Kigoma-Ujiji MC and Contractor	1000
	SO_2 (Odour)	Twice annually	Project site	mg/kg (hourly)	Detector tubes	0.1		1000
	NO_x	Twice annually	Project site	µg/nm^3 (24 hrs)	Detector tubes	150		1000
	Dust pollution (PM_{10})	Twice annually	Project site	µg/nm^3 hourly)	Mini-Vol Sampler	0.15		1000
	CO_2	Twice annually	Project site	ppm (1hr)	Detector tubes	35		1000
Frequency of illness landfill operators	illness of operation workers	Twice a year	Project site	Number of cases	Health records	-	Kigoma-Ujiji MC and Contractor	800
Noise pollution	Noise level	Twice annually	Project site	dBA (equivalent)	Noise meter	55	Kigoma-Ujiji MC and Contractor	1500
Ground and surface Water pollution	Trace Metal			mg/l	Sampling and analysis (AAS)	0.05	Kigoma-Ujiji MC and Contractor	
	Nitrate			mg/l	Sampling and analysis (Spectrophotometer)	30		400
	BOD/COD			mg/l	BOD/COD kit			400

	Sulphate	Twice annually	Shallow wells at Msimba area	mg/l	Sampling and analysis (Spectrophotometer)	600*		400
	Turbidity			NTU	Sampling and analysis (Spectrophotometer)	35		100
	Hydrocarbons			Mg/l	Sampling and analysis (HPLC)			600
	pH			-	pH meter	6.5-9.2		200
Total monitoring costs								**18,400**

9.2 Role and Responsibilities during ESMP Implementation

The Project Coordinator in the President's Office-Regional Administration and Local Government (PO RALG) will be responsible for the overall monitoring and quality assurance of the Project. While Kigoma-Ujiji Municipal council through Technical Support Team (TST) shall be responsible for ESMP implementation, the Project (PC-PO RALG) will have a quality assurance and monitoring role including all safeguards aspects. Further, the Kigoma-Ujiji Municipal council will submit all safeguards progress and monitoring reports to the PO RALG.

The PMO RALG will also be responsible for contracting and managing the Independent Environmental Monitoring Consultant (IEMC) who will monitor the environmental performance in all subprojects in Kigoma-Ujiji Municipal council. The IEMC's costs are therefore part of the PO RALG budget, and do not form part of the ESMP implementation costs.

A summary of the roles and responsibilities of the key parties and their relationships with regard to the implementation of the ESMP:

The Developer has full responsibilities to ensure that the contractor abides to regulation and specifications. Contractors have the main responsibility for implementing mitigation measures. Those measures will be included in the bidding documents and the costs are to be included in their bids and the construction contracts.

CSC is responsible for supervising and monitoring the day-to-day implementation of mitigation measures. The associated costs are included in CSC service contracts. IEMC will be responsible for environmental monitoring which includes (i) support to the EST/TST for implementing supervision and monitoring, and (ii) reporting on the implementation through periodic monitoring reports. The relationship, roles and responsibilities of the EST, TST, CSC, and IEMC are outlined in Figure 9.1 and Table 9.4.

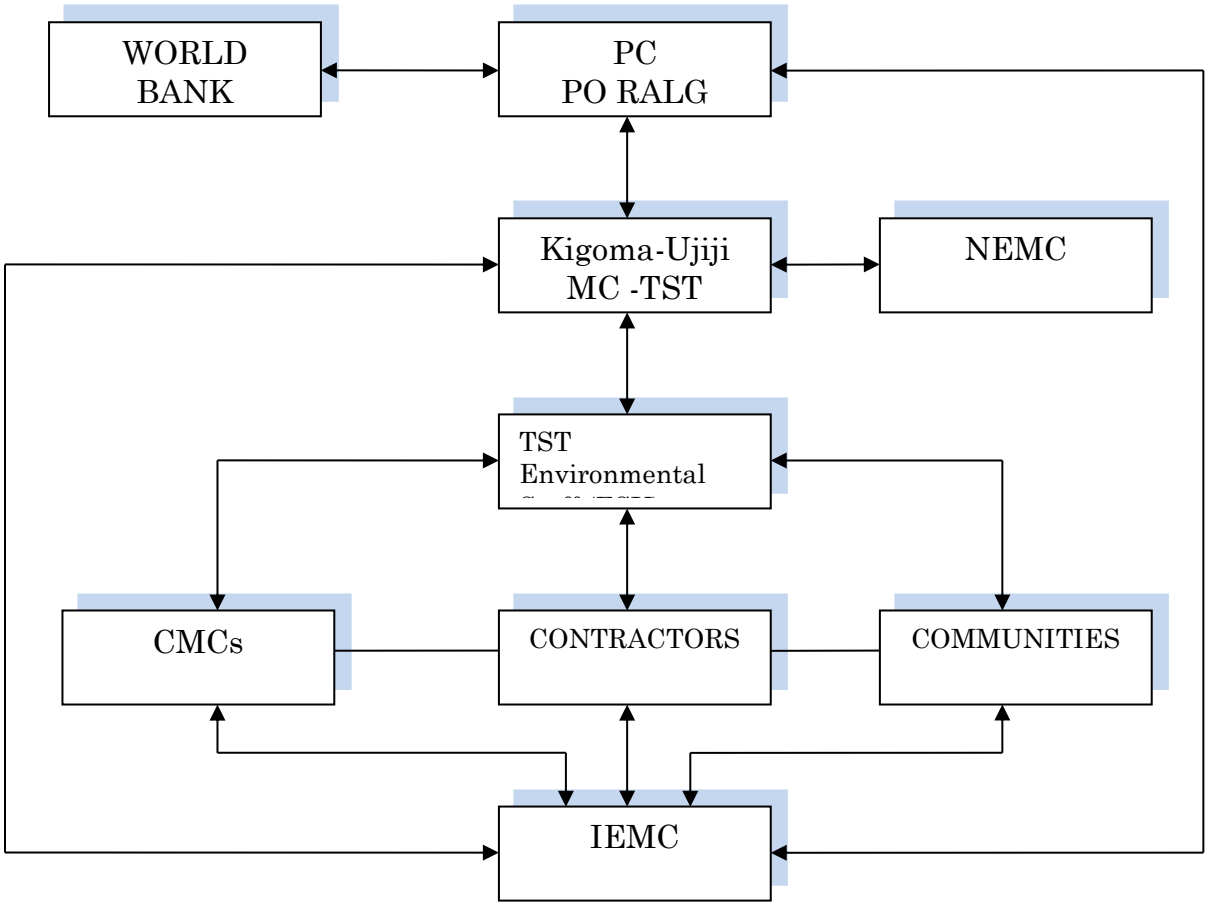

Figure 9.1: Environmental Management Organization Chart for Kigoma-Ujiji Municipal Council

Table 9.4: Role and Responsibilities of Key Parties for ESMP Implementation

Organ	Roles and Responsibilities
KMC-TST/ ESUs	-Responsible for implementing the ESMP during the detailed design and construction stages. ESMP implementation during operation stage is the responsibility of the Kigoma-Ujiji Municipal council. The council -TST will set up an Environmental and Social Team(EST) to ensure timely and effective implementation of the ESMP, including preparation of reports on safeguard compliance as required by Government and WB.
	– Responsible for ensuring that the relevant sections in the bidding and contract documents for all construction works are in compliance with the ESMP; this means they contain the requirements of the ECOPs and site-specific ESMPs.
	– Responsible for communicating with relevant local, regional and national departments; and with the agencies responsible for implementing and supervising ESMP, especially with the National Environmental Management Council (NEMC), and with the concerned wards/Sub-wards during planning, monitoring, management and operation.
	– Will coordinate with community organizations to encourage them to actively participate in the planning, management, and implementation of the project, including monitoring of the contractor's performance.
	– To ensure effective monitoring and timely implementation of the ESMP, Kigoma-Ujiji Municipal council -TST/ESUs will hire national environmental consultants to assist them with carrying out and monitoring the ESMP implementation.
	– In the course of supervising and monitoring the contractors' performance, Kigoma-Ujiji Municipal council -TST will be responsible for: (a) checking project implementation indicators relating to the environment; (b) conducting unscheduled, surprise inspections to ensure that mitigation measures are being implemented as required in construction contract by contractor; (c) reviewing the periodic reports of the Construction Supervision Consultant (CSC) to ensure compliance with mitigation measures and ESMPs; and (d) based on the periodic reports by CSC and IEMC, preparation of reports on environmental compliance of subprojects, to be submitted to WB and NEMC (this will be part of the

Organ	Roles and Responsibilities
	submission of progress report to WB every six months).
	– Coordinate closely with relevant supply utilities i.e. KUWASA and the Environmental Management department (sanitation and solid waste management) to monitor their interaction with the project during operation and maintenance phase.
Construction Supervision Consultant (CSC)	-Responsible for monitoring the safeguard performance of the contractors during site clearance and construction, including oversight of the self-monitoring to be conducted by contractor. With regard to environmental safeguards, the CSC's main responsibility will include, but not be limited to, the following:
	– Assist IEMC to establish, collect and provide information essential environmental indicators, on-site and for the construction works.
	– Ensure that all work comply with the approved ESMPs, as set out in documents for environmental impact mitigation and monitoring.
	– Monitor the implementation of mitigation measures by the contractors, propose and deploy any necessary supplementary measures in time to improve mitigation measures to fully meet the environmental management and safety requirements of project.
	– Prepare action plans and/or propose urgent solutions to cope with environmental problems, emergency situations and damage that occurred during construction
	– Recommend to Kigoma-Ujiji Municipal council -TSTs to suspend partially or completely construction work if labour safety and environmental protection requirements of the contract are not being complied with.
	– Organize regular discussions with relevant parties, agencies and other stakeholders to provide information about implementation plans to increase people's awareness of the need for environmental protection and management during construction process.

Organ	Roles and Responsibilities
Construction Contractor	Responsibilities with respect to all aspects of the works, including the environmental aspects, are set out in the contract documents, signed with the Kigoma-Ujiji Municipal council -TST.
	– Construction contractors are responsible for carrying out environmental impact mitigation measures and for complying with the approved ESMP when implementing construction contracts. When preparing the "Contractors ESMP", the contractor will study the project's approved EIA report and propose a construction method that includes environmental mitigation and monitoring measures that are in line with the approved ESMP.
	– Contractor's ESMP will be submitted to Kigoma-Ujiji Municipal council -TST and CSC for review, as well as to IEMC, as deemed necessary. Changes, if any, will be evaluated for their feasibility and for legal issues (laws, decrees, circulars and other regulations) before suitable adjustments are approved for specific cases on-site.
	– During the construction work, the construction contractors will be closely supervised by Kigoma-Ujiji Municipal council -TST, CSC, IEMC, environmental authorities and the local community for their compliance with the ESMP.
Independent Environmental Monitoring Consultant (IEMC*)*	The IEMC will be responsible for assisting the Kigoma-Ujiji Municipal council -TST with the ESMP implementation. This also includes advising the CSC, contractors and communities on environmental compliance, and on carrying out the monitoring program in accordance with regulations, procedures and policies of the Government and the WB, respectively. After the detailed implementation of the environmental monitoring programs was discussed by the Kigoma-Ujiji Municipal council -TST and World Bank supervision staff, the IEMC will be responsible for quarterly checking, and for supporting the Kigoma-Ujiji Municipal council -TST staff to supervise overall project activities to ensure that uniform environmental policies of the Government and World Bank are applied and supervised during project implementation. The IEMC will be responsible for: (1) providing training and capacity building for construction management Kigoma-Ujiji Municipal council -TST/ESTstaff, including field engineers and/or consultants (CSC), in supervising the ESMP implementation by the contractors; (2) ensuring

Organ	Roles and Responsibilities
	active participation of the local communities and schools in the project areas, (3) monitoring of environmental parameters to assess the overall impacts of the project, and (4) establish the environmental training program
	– Ensuring that the approved ESMP and all other relevant project legal agreements related to environmental safeguards are fully applied and complied with during project implementation.
	– Assessing the effectiveness of mitigation measures which are applied by contractors and CSC during project implementation; providing proposals and recommendations to the Kigoma-Ujiji Municipal council -TSTs on improvements needed to meet the safeguard requirements.
	– Reporting periodically (every 3 months) to the Kigoma-Ujiji Municipal council -TSTs on actual ESMP performance during project implementation.
	– Establishing standard procedures, methods and forms to assist the Kigoma-Ujiji Municipal council -TSTs and CSC to assess contractors' progress in implementing the required impact mitigation and monitoring measures.
	– Assisting the Kigoma-Ujiji Municipal Council -TSTs' environmental staff to review and check that relevant environmental sections (based on the ESMP) have been included in the bid packages and construction contract documents to ensure compliance with environmental policies and impact mitigation and monitoring requirements.
	– Measuring, taking samples and monitoring periodically the key environmental parameters, i.e. once every 3 months.
	– Assistance with the preparation of documents and implementation of training programs in environmental monitoring and supervision for contractors, CSC and relevant staff of the Kigoma-Ujiji Municipal council -TST (environmental staff and coordinators of contract packages).
	– Via Kigoma-Ujiji Municipal Council -TST, discussing with relevant enterprises, as necessary, to find suitable solutions for unexpected risks relating to environmental sanitation.

9.3 Institutional Arrangements and Reporting Procedures

Kigoma-Ujiji Municipal Council -TST, assisted by environment specialists, will be responsible for reviewing civil works contracts in accordance with the ESIA report; coordinating the implementation of the ESMP among the contractors, local environmental authorities (e.g., Ward Development Committees; monitoring the implementation of the ESMP and the civil works contracts in collaboration with NEMC and PO-RALG and, preparing annual environmental progress reports.

The purpose of environmental and social monitoring is to quantitatively measure the environmental effects of the road project. The environmental monitoring program will operate through the pre-construction, construction, and operation phases. It will consist of a number of activities, each with a specific purpose, key indicators, and significance criteria.

The monitoring of mitigation measures during design and construction will be carried out by the contractor's environmental manager and the engineer's environmental and social specialist. They will conduct mitigation monitoring as part of the regular works inspections. The weekly inspection will be undertaken by the Contractor's Environmental Manager. When available and appropriate the inspection will also be attended by Engineer's Environmental and Social Specialist, the main Contractors site management staff and their specialist advisors (WB Specialists etc). A weekly Environmental Compliance Report will be produced following each inspection and will incorporate any actions identified during any PMO-RALG/World Bank inspections. The inspection report will summarize the status of the site's compliance, and include photographic records if appropriate. The reports will cover, among other matters as appropriate, the following:

- Contractor's compliance with mitigation measures
- Wastewater and environmental sanitation issues
- Traffic congestion or disruption
- Performance of the water supply systems
- Potential project-related risks and risk management issues
- Quality of water in streams crossing the project roads
- Status of measures to assist project-affected people at the new resettlement sites on environmental aspects
- Consultation with local communities in key project areas

The responsibility for mitigation monitoring during the operation phase will lie with the Environmental Section in Kigoma-Ujiji Municipal Council.
Kigoma-Ujiji Municipal Council -TST will provide PO-RALG and NEMC with reports on environmental compliance during implementation as part of their annual progress reports and annual environmental monitoring reports. Depending on the implementation status of environmentally

sensitive areas of the project, NEMC will perform annual environmental reviews in which environmental concerns raised by the project will be reviewed alongside project implementation.

9.4 Capacity Building Program

During consultation with the Kigoma- Ujiji MC technical staff it was revealed that the Department of Works no staff specifically dedicated to implementation of Environmental and Social Safeguards relevant to civil works. The Municipality have a section of Environment in the Urban Development Department, and in the Health Department who are responsible for overseeing environmental issues in the Municipality. Each department have at least one environmental officer who solely deals with environmental issues on daily basis. It was revealed that staffs have limited knowledge on environmental and social safeguard requirements during project implementation and operation phases. Such lack of capacity represents a risk to the implementation of safeguards requirements as contained in the ESMP and as required by the WB policy. It therefore is necessary to address this weakness through capacity building. It is proposed to provide capacity building through technical assistance that will support the municipal during the implementation of the ESMP. The technical assistance will provide the necessary support to the Kigoma-Ujiji MC in its work with contractors as well as other entities involved in the implementation of the ESMP.

The technical assistance will include support from experts and training that will cover (i) general knowledge of safeguards requirements and project procedures, and (ii) important specific knowledge in safeguard procedures and requirements for project staff, consultants, and national contractors. This will include, for example, assistance with the preparation of documents and implementation of training programs on environmental management and environmental monitoring for contractors and relevant staff of Kigoma-Ujiji MC (TST) to do their tasks. It will also include assisting Kigoma-Ujiji MC environmental and social staff with the review of contract documents to ensure compliance with the ESMP. It will also provide general environmental guidance as requested by Kigoma-Ujiji MC to enhance overall project implementation and performance.

Given the nature, locations, and scale of construction, it is anticipated that the safeguard technical assistance support and training will be provided during project implementation. The WB safeguard specialists will support this in the capacity building program, in particular in the training activities as appropriate.

Proposed Training Programs

Table 9.5 provides examples of the basic training programs for safeguards during project implementation. The training programs will be developed and delivered by the Technical Assistance team for the implementation of safeguards for the Kigoma-Ujiji MC training. Trained staff with the support of the Technical Assistance team for the implementation of safeguards will provide the training to contractors and other entities concerned.

Other more specific and tailored training will be developed and agreed upon between Kigoma-Ujiji MC and the Technical Assistance team for the implementation of safeguards during project implementation based upon a reassessment of needs and the status of safeguards implementation.

- *Target groups for the training:* Kigoma-Ujiji MC -TST, PO-RALG staff, Contractors and community representatives in the project area.
- *Training schedule:* at least 1 month before the construction of the first contract. The training can be adjusted in line with the implementation schedule of the subproject/contracts.
- *Training frequency*: The basic training programs proposed in table below will take place every six months on a yearly basis and its content updated and adapted to implementation issues. Training frequency and content will be reassessed during implementation depending on needs. It is foreseen that the training program for Kigoma-Ujiji MC staff will continue until year end of construction period. Three days of training for contractors are also planned to take place twice a year on an annual basis for at least two years.

Table 9.5: Training Programs for Capacity Building in Environmental Supervision and Management

Target Group	**PO-LARG Staff and K-UMC Staff**
Course Title	Environmental supervision, monitoring and reporting
Participants	Environmental staff and technical staff (Project Coordinator from PMO-RALG, 14 Kigoma-Ujiji MC staff (Works dept - 4 Enginees and 3 Technicians; Health Dept - 4; Urban Development Dept. -3).
Training Frequency	Soon after project effectiveness but at least 1 month before start of construction of the first contract. Follow-up training will be scheduled as needed.
Time	Four days of training, to be held twice a year, and then to be repeated on a yearly basis until year three of implementation.
Content	General environmental management relating to the project, and covering the requirements of NEMC and WB; General aspects of environmental supervision; Implementation and supervision of mitigation measures; Community participation in environmental supervision monitoring; Guidance and supervision of contractors, Subcontractors and community representatives in the implementation of environmental supervision; Use of forms for environmental supervision; Risk response and control; Receipt and submission of reporting forms; and Other areas of training needs, as determined
Responsibilities	PO-RALG, Kigoma-Ujiji MC with support of the Technical Assistance team for the implementation of safeguards.
Target Groups	**CONTRACTORS, SUBCONTROCTORS, WARDS AUTHORITIES, COMMUNITY REPRESENTATIVES**
Course Title	Implementation of mitigation measures
Participators	On-site construction management staff; environmental staff of contractors; ward/group authorities.
Training frequency	After bidding, and determine based on needs
Time	3 days of training for contractors and 2 days of training for others, to be repeated twice a year on an annual basis depending on needs

Content	• Overview of environmental monitoring; • Requirements of environmental monitoring; • Role and responsibilities of contractors • Scope and methods of environmental monitoring; • Response and risk control; • Propagate monitoring forms and guide how to fill in the forms and risk report; • Preparation and submission of reports • Other areas to be determined.
Responsibilities	PO-RALG, Kigoma-Ujiji MC with support of the Technical Assistance team for the implementation of safeguards
Target Groups	**COMMUNITIES AND WORKERS**
Course Title	Environmental sanitation and safety
Participators	Representatives of community and/or worker leaders (as appropriate)
Training frequency	As appropriate
Time	One-day presentation and one-day on-the job training twice a year, to be repeated on as needed basis
Content	Preliminary presentation on environmental protection and environmental overview Key issues that require communities' and workers' attention to minimize safety risks (roads, waterways, equipment, machines, open excavations, etc.) as well as reduce pollution (dust, fumes, gases, oil/grease spills, waste management, etc.) Management of environmental safety and sanitation on work sites; Mitigation measures at construction sites; Safety measures on electricity, mechanical, transportation, air pollution; Procedures to deal with emergency situations; and Other areas to be determined.
Responsibilities	Contractor and Kigoma-Ujiji MC

10.0 DECOMMISSIONING AND DEMOBILISATION PLAN

1.1 Introduction

As the decommissioning Rusimbi road and that of Lubengera and NHC-Katubuka storm drains is not anticipated in the remote future, the specific conditions for mitigation are generally inherently uncertain. The Lnadfill cell will however require decommissioning. Decommissioning will entail continued monitoring and regular maintenance of leachate ponds and that of landfill gas control systems.

The most important part of landfill closure and restoration plan, where ground water protection measures are in place, is to construct low permeability cover or cap, over the waste when the final elevations reached. The following procedures are typically proposed to close and restore a landfill:

1. Cover all the waste
2. Permit sufficient time for settling of any recently deposited waste
3. Apply final cover
4. Grade final slopes to around 5%
5. Install permanent systems of surface drainage channels on the landfill
6. Check sediments and erosion control and modify according to any changes in slopes
7. Dissemble temporary structures (i.e. campsite) and waste receiving areas not required for the after use of the site
8. Seed the final cover with appropriate mixture of grasses.
9. Outline a timetable to ensure that that the following features are inspected at appropriate regular intervals:
10. Settlement: Evaluate cover soil integrity and need for grading
11. Close check on sedimentation and erosion control facilities
12. Periodic monitoring of leachate and gas control facilities
13. Vandalism and squatting prevention measures
14. Selection and planting of vegetation cover, in preparation of the site for alternative use.
15. Fencing and installation of sign posts around the landfill area.

In view of this, specific mitigation measures pertaining to environmental impacts of decommissioning works cannot be proposed at the moment with a reasonable degree of certainty.
A Detailed decommissioning plan that takes environmental issues into consideration shall be prepared by the developer prior to the decommissioning works. Should it be done, decommissioning may entail

change of use (functional changes) or demolition triggered by change of land use. Therefore what is presented here is just a preliminary deccommissioning plan which give light to what shall be done if the need for decommissioning arise.

10.2 Preliminary Decommissioning Plan

This Section provides a brief outline of the works required to demolish the Proposed infrastructures on the site incase it happen. This Plan will be used as a reference document that provides the framework to ensure that demolition activities on the site do not adversely affect the health, safety, traffic or the environment of the public and neighbouring properties.
The Contractor will be required to prepare a detailed Demolition Plan and Construction Management Plan to the satisfaction of the Proponent and relevant Authorities prior to the commencement of works on site.

10.2.1 Demolition Methods

It is anticipated that the Contractor will prepare a detailed Demolition Plan prior to the commencement of work on site, however, the indicative demolition methodology will be as follows:

- The strip out and removal of non-structural elements will be undertaken utilising manual labour and small plant including – bobcats, 3-5t excavators and dingo type loaders.
- The materials will be removed from site using small to medium sized trucks.
- The structures will be demolished using larger plant and equipment including 15-40t hydraulic excavators. These machines will be equipped with rock breakers, pulverisers and the like which would be used in a sequential manner.
- During the demolition process erosion control measures will be established. These will include treatment of dust and potential discharge into stormwater systems.

10.2.2 Materials Handling

Materials handling will be by mechanical plant (including excavators and bobcats) loaded into trucks (bogie tippers and semi trailers). The debris will be carted offsite to an approved waste facility or recycling centre.
The contractor shall submit a Demolition Waste Management Plan to Kigoma Municipal council which outlines the objectives of:

- maximisation, reuse and recycling of demolition material
- minimisation of waste disposal
- evidence of implementation for specified arrangements of waste management

On-site storage of reusable materials will occur at Site. Recycling and disposal containers will also be accommodated at this location for collection vehicles. Hazardous materials will be treated separately. A hazardous materials inspection will be undertaken by an accredited consultant and a report issued. Hazardous materials will be removed in accordance with EMA 2004. A final clearance report will be provided by the hygienist which will include the provision of tip dockets from waste centres.

10.2.3 Proposed Sequence

The Contractor will be required to prepare the following documentation prior to the commencement of demolition and/or excavation works:

- Dilapidation Survey
- Construction Waste Management Plan
- Demolition Management Plan

10.2.4 Protective Measures

An A Class hoarding will be erected around the perimeter of the construction site prior to the commencement of demolition works. Additionally, wherever the risk arises of material falling into public areas, overhead protection will be provided in the form of a B Class hoarding. Scaffolding will be erected to facades where materials could fall in excess of 4m.

The scaffolding will be clad with chainwire and shadecloth to enclose debris and dust onto the site. During the demolition, dust control measures will be used to minimise the spread of dust from site. The Contractor will have a senior representative on site at all times to ensure compliance with the safety guidelines and agreed work methods.

10.2.5 Traffic Management

The management of construction traffic during the deccommissioning phase will be subject to the provision of a detailed traffic management plan. This plan will be prepared by the Contractor for the various stages of demolition. During demolition, all traffic will be held within the site boundaries. The site will remain closed to pedestrian traffic and will be generally manned by security.

10.2.6 Ocupational Health and Safety

A detailed OH&S Policy will be provided by the Contractor prior to work commencement. A detailed Site Safety Plan will be prepared for the specific project.

10.2.7 Environmental Management Plan

A detailed Environmental Management Plan will be provided by the Contractor prior to the commencement of the work.

10.2.8 Potential Impacts and Mitigation Measures

Dust and Noise Pollution

The demolition activities for the remained part (foundation structure) shall be accompanied with emission of a lot of dusts since the demolition works are expected to be carried out by conventional method using mechanical breakers and jackhammers. However, alternative methods of demolition including explosive techniques can be used.

Mitigation Measures

- Water sprinkling shall be applied to open earth to reduce dust emission.
- Trucks transporting construction materials shall be covered if the load is dry and prone to dust emissions.
- The demolition area shall be fenced by iron sheets; this will prevent the dust at the ground to be picked up by the wind.
- Community notification shall be undertaken where appropriate where work is likely to cause dust impact on the public and nearby residents.
- Sound construction equipment, with noise sinks, shall be used
- Machine operators in various sections with significant noise levels shall be provided with noise protective gear.
- Construction equipment shall be selected, operated and maintained to minimize noise.

Increased Waste

A lot of demolition waste is expected as a result of the demolition of these blocks. These shall include blocks, concrete, reinforcements, pipes etc. Most of the block materials shall be salvaged and recycled.

Mitigation Measures

- All materials which can be reused shall be reused
- Materials that cannot be reused shall be sent to a the authorized dumpsite

11.0 CONCLUSIONS AND RECOMMENDATIONS

The proposed additional investment subprojects in Kigoma-Ujiji Municipality are environmentally feasible and consistent with the socio-economic development plans of the municipality, Kigoma region and the nation at large. It is anticipated that the project shall meet the expected needs for socio-economic development in the municipality, supports sustainable development.

Broad stakeholder's consultations have been done during scoping. The consulted community seemed very positive about the projects implementation and urged the municipality to contract competent contractors, and also involve the local community to enhance their sustainability.

A number of positive and negative impacts were identified, and for each mitigations or enhancement measures have been provided. Positive impacts of the project include improved road accessibility, reduction of effects of floods, reduction of soil erosion and improvement to the municipality solid waste management system. Negative impacts include the normal construction related impacts such as air quality deterioration, surface and ground water pollution. Predicted impacts during the operation phase are such as contamination of ground water by landfill leachate, air pollution by landfill gasses and roads accidents on the new Rusimbi road. Impacts mitigation and enhancement measures have been proposed in the ESMP. Provisions in the ESMP will form part of the project contractors' contracts and the TST and their CSC will ensure that the contractors comply with the provisions of the contract, including those relating to environmental issues. In accordance with their contracts, in case of site-specific impacts, contractors will be required to prepare site-specific detailed designs and ESMPs. The site-specific ESMPs will be approved by the CSCs prior to the work commencing. Periodic monitoring reports will be prepared by independent environmental monitoring consultants and the results will be submitted to the World Bank and the Government.

To facilitate effective mitigation of impacts during operation, the project will also provide substantive support for capacitybuilding, including training courses, at the city level to ensure that the ESMPs will be implemented and their performance monitored.

Environmental monitoring will be carried out to ensure that the project activities will not create adverse impacts. The monitoring results will be periodically reported to the World Bank and the Government.

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26) World Bank Operational Policy 4.01

Appendix

Appendix1: List of People consulted

KIGOMA -UJIJI

ESIA FOR PROPOSED ADDITIONAL SUB-PROJECTS IN ~~TANGA CITY~~ UNDER THE TANZANIA STRATEGIC CITIES PROJECT (TSCP)
STAKEHOLDERS CONSULTATION FORM

DATE	NAME	ORGANISATION	POSITION	CONTACT	SIGNATURE
18/11/14	ENG BONIFACE NYAMBELE	KUMC	MD	0754-730043	[signature]
-"-	ENG. MOSES NERANDRI	KUMC	DMWE	0754207915	[signature]
-"-	MUSA MKUNDA	KUMC	Ag ME	0713-378275	[signature]
-"-	ANTONY J. AINEKISHA	KUMC	CRC	0754483156	[signature]
-"-	Eng. Boniface William	KUMC	ME	0754081472	[signature]
-"-	MARIAM K. HUSSEIN	VEO-MSIMBA	VEO	0752482984	[signature]
-"-	JACKSO MBATILA	KUMC	EHO	0766020800	[signature]
-"-	DEOGRATIAS.M. RULAKUZE	MWANANCHI	MDAU	0757194524	[signature]
-"-	Ackley Aloyce	MDAU	-"-	0765-892165	[signature]
-"-	ELIAS N' JOSEPH	MDAU	-"-	0766354393	[signature]
	ZABIBU HASSANI	MDAU	-"-	0754841285	[signature]
-	DEBORA YOTHAM	MDAU	-"-	0768456190	[signature]

KIGOMA - UJIJI - MUNICIPAL

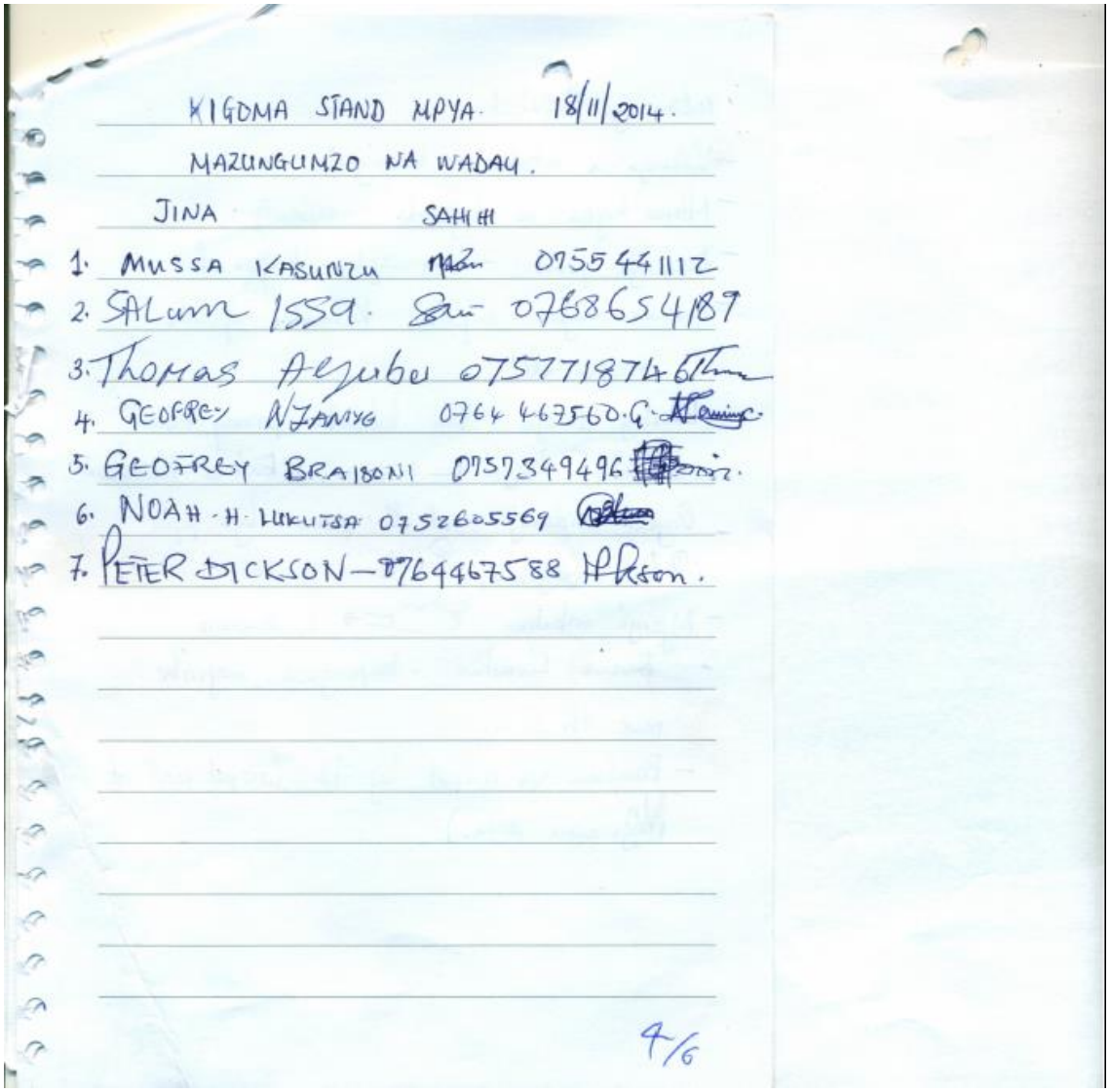
ESIA FOR PROPOSED ADDITIONAL SUB-PROJECTS IN ~~TANGA CITY~~ UNDER THE TANZANIA STRATEGIC CITIES PROJECT (TSCP)
STAKEHOLDERS CONSULTATION FORM

DATE	NAME	ORGANISATION	POSITION	CONTACT	SIGNATURE
18/11/2014	Eng. Felix O. Muimuka	TANESCO	Ag. Regional Manager	0753934032	

KIGOMA - UJIJI

ESIA FOR PROPOSED ADDITIONAL SUB-PROJECTS IN ~~TANGA CITY~~ UNDER THE TANZANIA STRATEGIC CITIES PROJECT (TSCP)
STAKEHOLDERS CONSULTATION FORM

DATE	NAME	ORGANISATION	POSITION	CONTACT	SIGNATURE
17/11/2016	Simon Lupuga	KUWASA	MD	0762740393	
-11-	Lenard Nzilayitwa	[illegible]	Mtwno	0754275035	
-11-	Lenard Nzilayitwa	KUWC	Ag MUPO	0786271843	
4	Dodorcah V. Dodorcah	LTBWB	Ag BWO	0754559668	
-11-	Bono J. Mwemi	LTBWB	CDO	0768161979	



KIGOMA STAND MPYA. 18/11/2014.

MAZUNGUMZO NA WADAU.

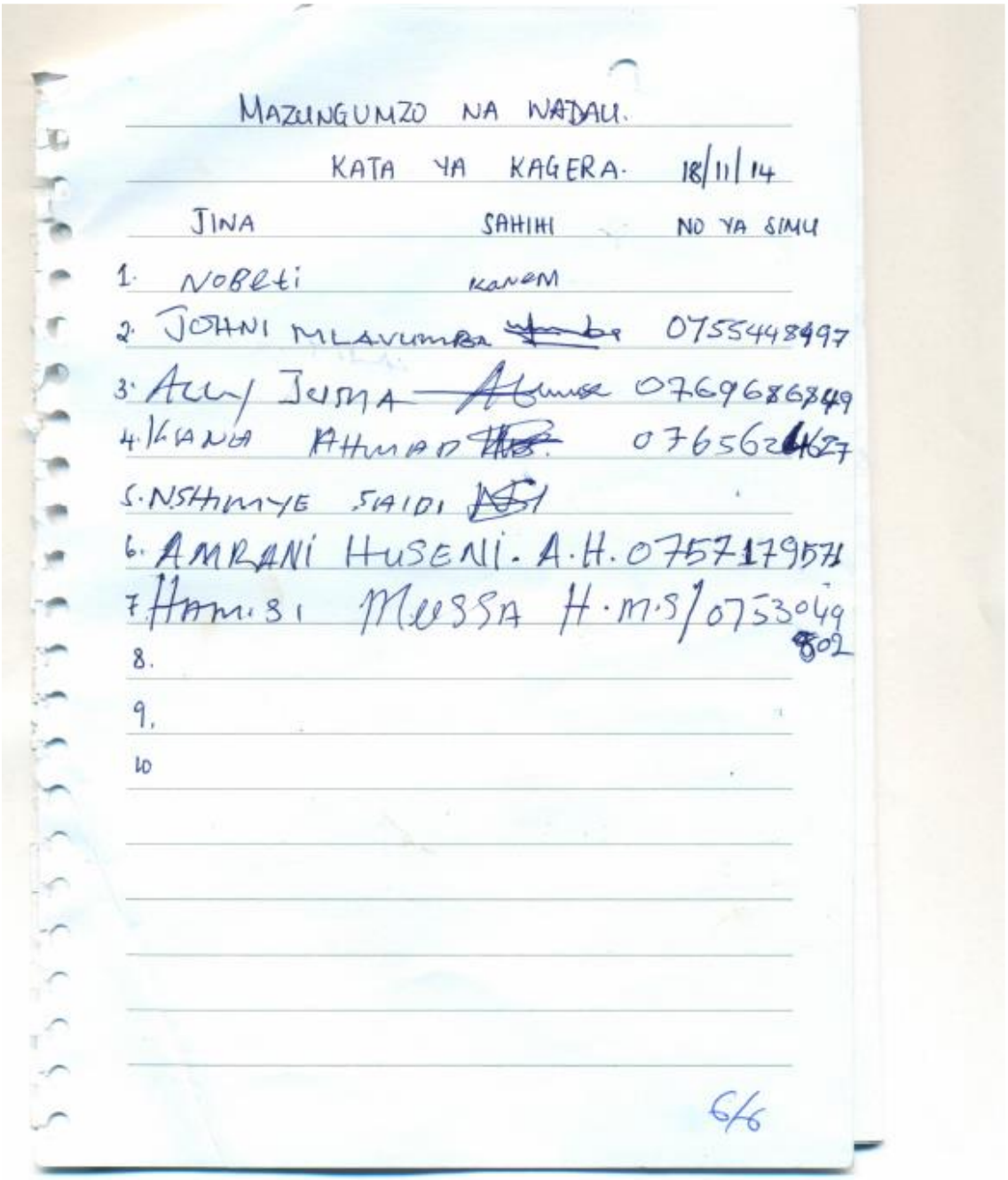
	JINA	SAHIHI	
1.	MUSSA KASUNZU		0755441112
2.	SALUM 1559.		0768654187
3.	THOMAS AGUBU		0757718746
4.	GEOFREY NJANYG		0764467560.G.
5.	GEOFREY BRAISONI		0757349496
6.	NOAH. H. LUKUTSA		0752605569
7.	PETER DICKSON		0764467588

4/6

Kata ya Katubuka

- Vidaraja - hatari - kuanguka
- Mteno huyaa na kufurika - capacity.
- Discharge point - kumwagilia - kufua etc.
- Bwawa hujaa kufurika, kuharibu nyumba. mazao etc.
- Existing daraja btn Katubuka primary + Sec. baada ya daraja erosion. → Extend the drain.
- Ongeza vidaraja at all places c high ppln. ① kwa Magolwa, ② Ye
- Mfereji mkubwa → to ziwani
- Bwawa liboreshwe - kupunguza mafuriko near the dam.
- Barabara ya airport hufurika (airport road at Mnaguruwani area.)

5/6



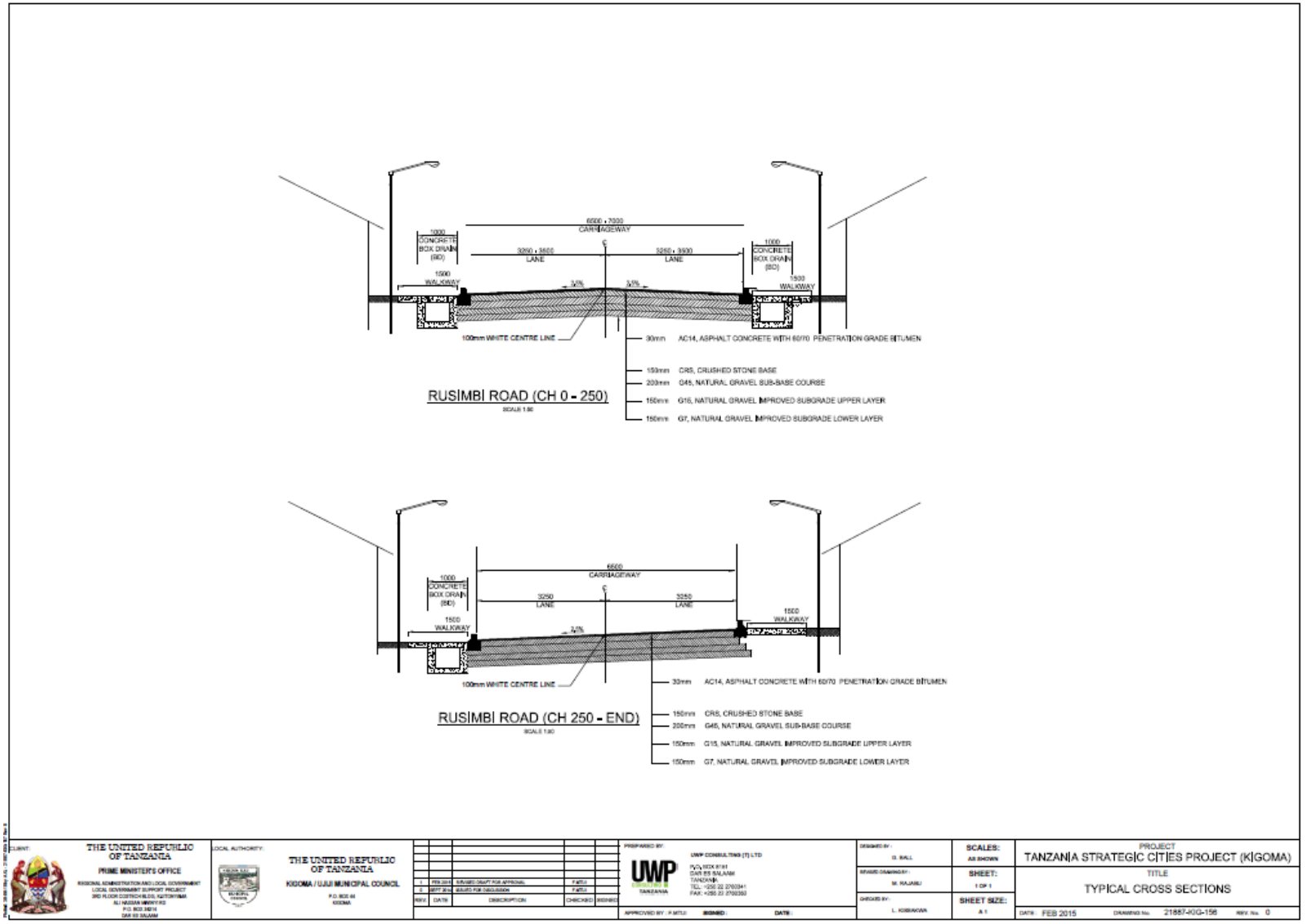
MAZUNGUMZO NA WADAU.

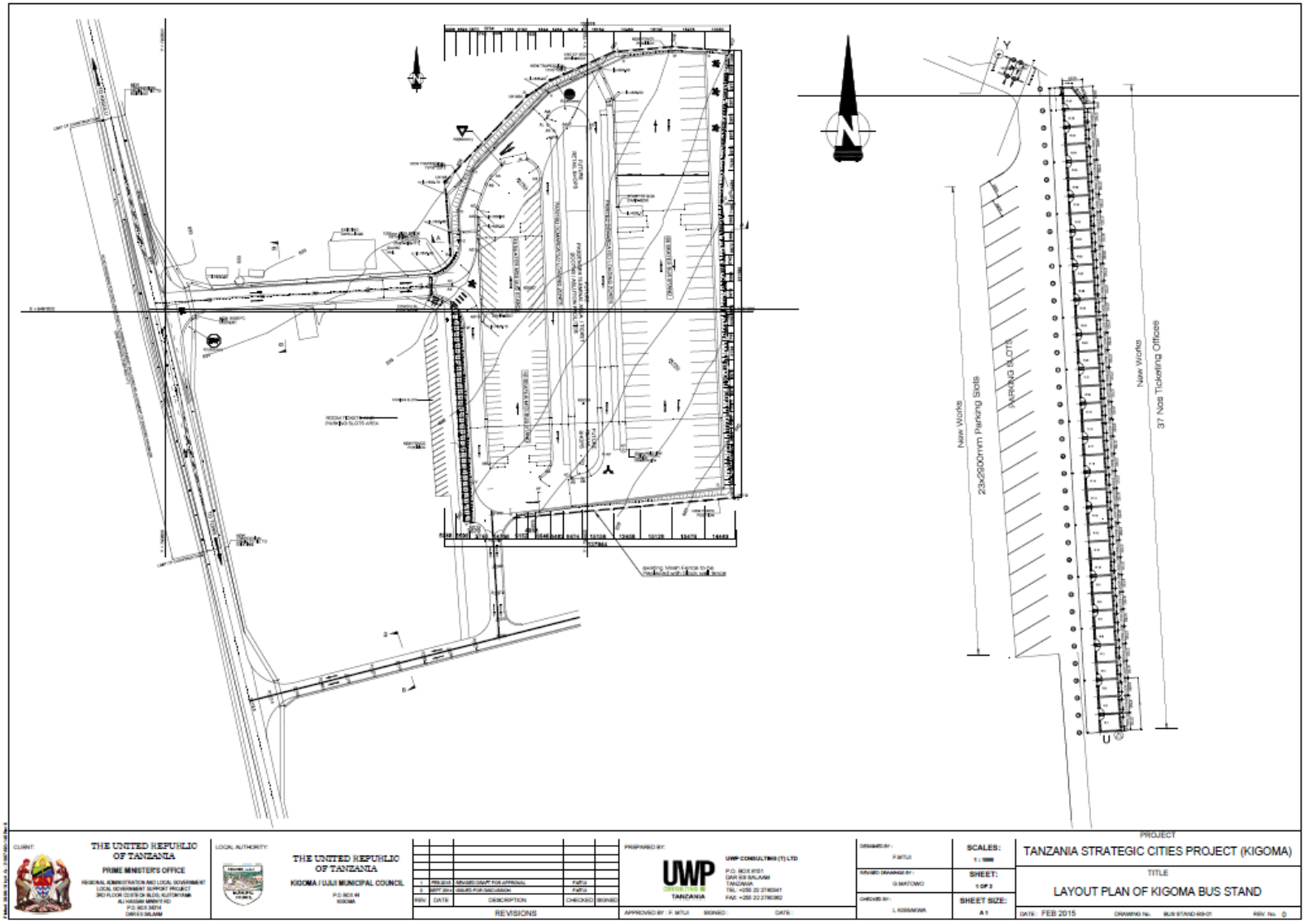
KATA YA KAGERA. 18/11/14

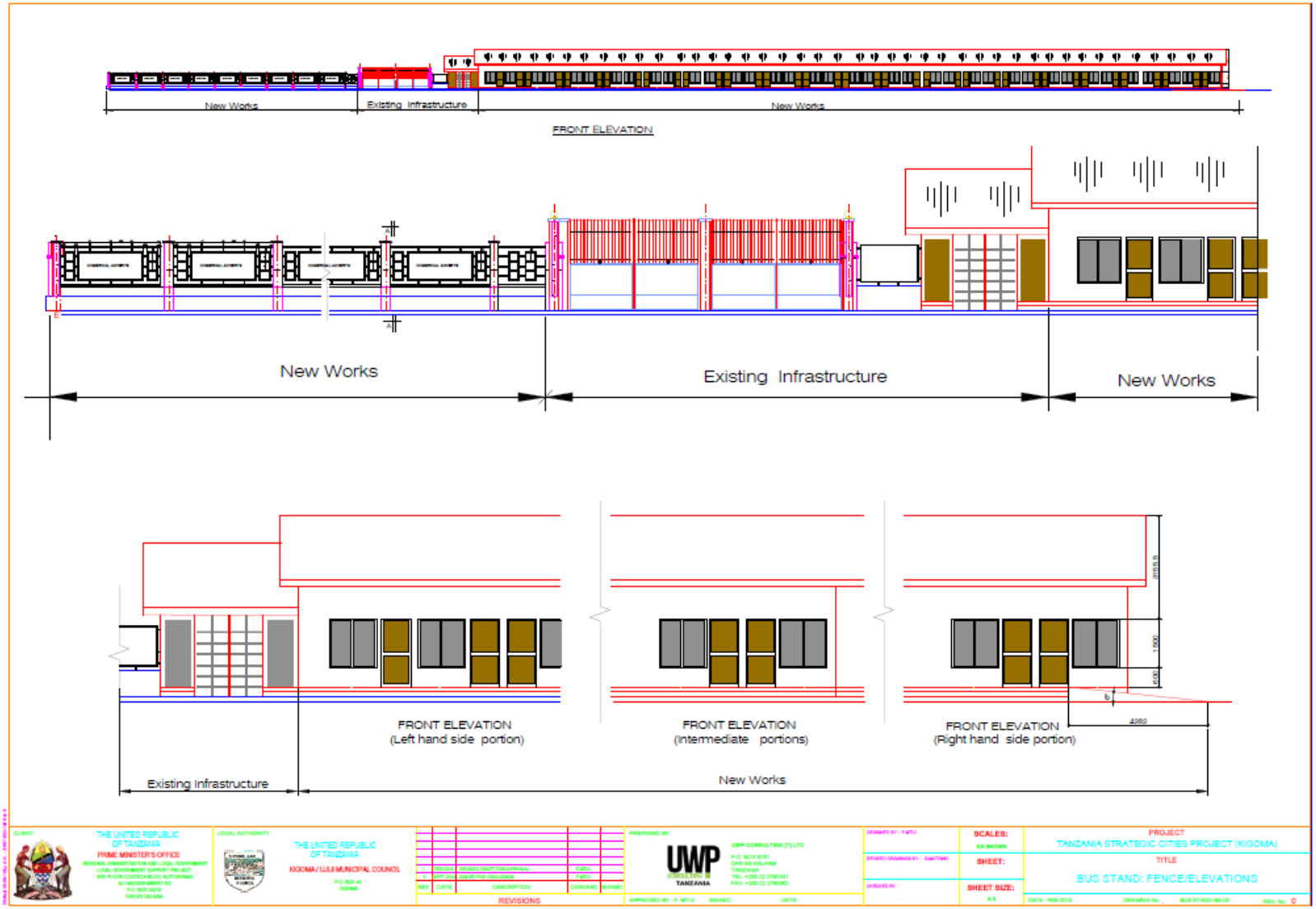
	JINA	SAHIHI	NO YA SIMU
1.	NOBERTI		
2.	JOHNI MLAVUMBA		0755448497
3.	ALLY JUMA		0769686349
4.	KANJA AHMAD		0765624627
5.	NSHIMIYE SAIDI		
6.	AMRANI HUSENI. A.H.		0757179571
7.	HAMISI MUSSA	H.M.S	0753049802
8.			
9.			
10			

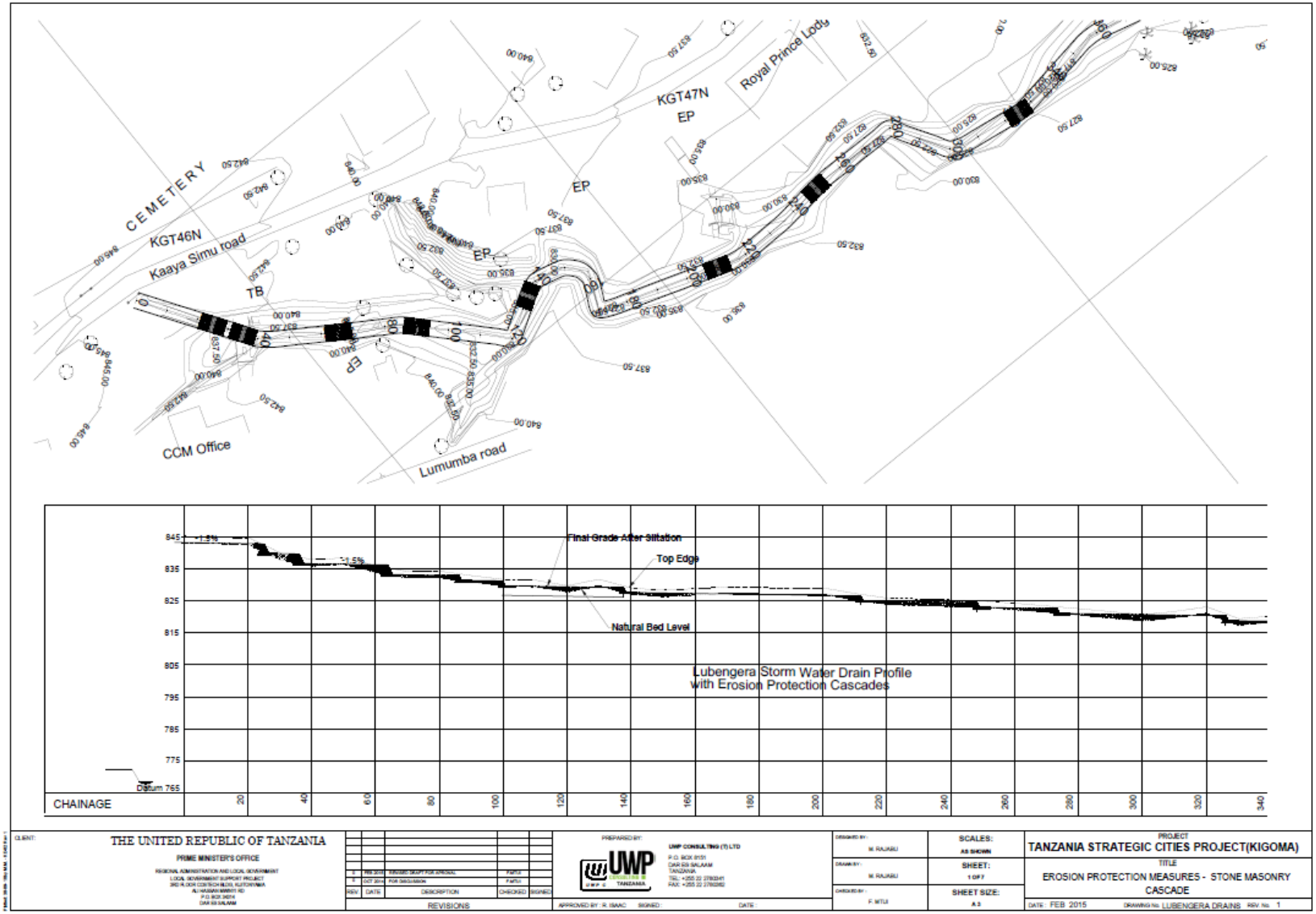
6/6

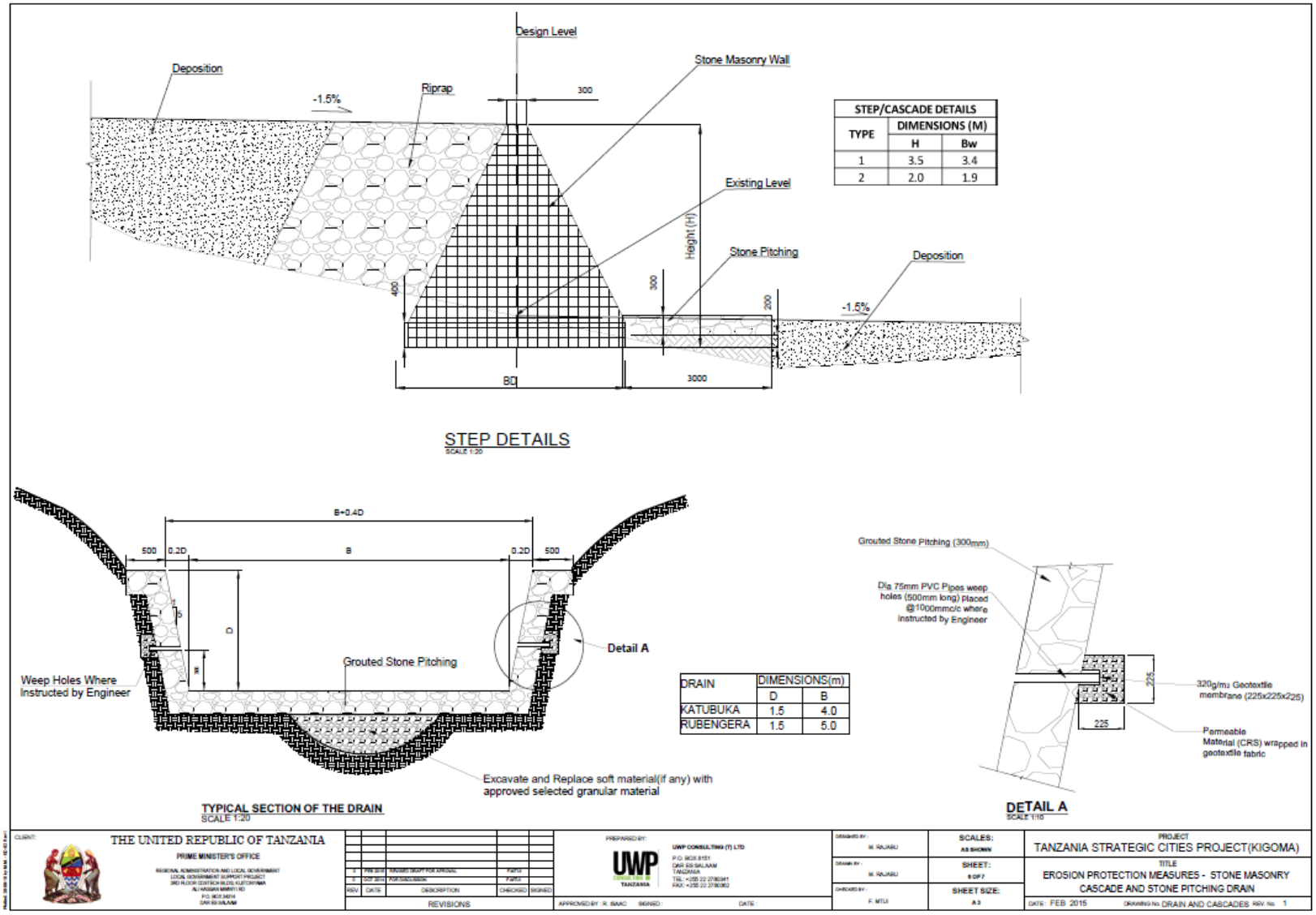
Appendix 2: Sample Drawings of the Proposed Facilities

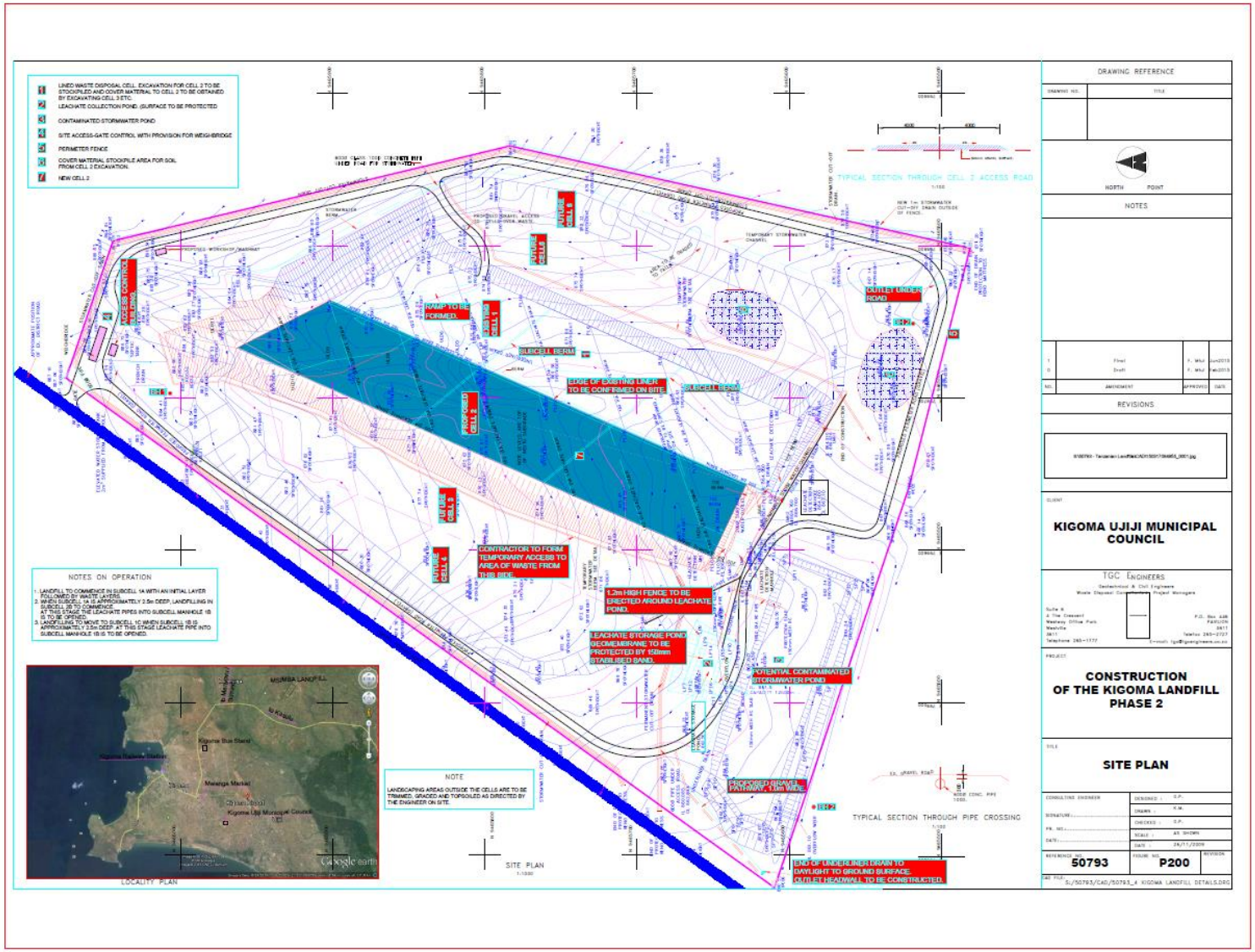

1000 CONCRETE BOX DRAIN (BD)
6000 - 7000 CARRIAGEWAY
3250 - 3500 LANE
3250 - 3500 LANE
1000 CONCRETE BOX DRAIN (BD)
1500 WALKWAY
3.0%
3.0%
1500 WALKWAY
100mm WHITE CENTRE LINE
30mm AC14, ASPHALT CONCRETE WITH 60/70 PENETRATION GRADE BITUMEN
150mm CRS, CRUSHED STONE BASE
200mm G45, NATURAL GRAVEL SUB-BASE COURSE
150mm G15, NATURAL GRAVEL IMPROVED SUBGRADE UPPER LAYER
150mm G7, NATURAL GRAVEL IMPROVED SUBGRADE LOWER LAYER
RUSIMBI ROAD (CH 0 - 250)
SCALE 1:50
1000 CONCRETE BOX DRAIN (BD)
6000 CARRIAGEWAY
3250 LANE
3250 LANE
1500 WALKWAY
3.0%
1500 WALKWAY
100mm WHITE CENTRE LINE
30mm AC14, ASPHALT CONCRETE WITH 60/70 PENETRATION GRADE BITUMEN
150mm CRS, CRUSHED STONE BASE
200mm G45, NATURAL GRAVEL SUB-BASE COURSE
150mm G15, NATURAL GRAVEL IMPROVED SUBGRADE UPPER LAYER
150mm G7, NATURAL GRAVEL IMPROVED SUBGRADE LOWER LAYER
RUSIMBI ROAD (CH 250 - END)
SCALE 1:50
CLIENT:
THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
LOCAL AUTHORITY:
THE UNITED REPUBLIC OF TANZANIA
KIGOMA / UJIJI MUNICIPAL COUNCIL
REV. DATE DESCRIPTION CHECKED ISSUED
1 FEB 2015 ISSUED DRAFT FOR APPROVAL F.MTUI
2 SEPT 2014 ISSUED FOR DISCUSSION F.MTUI
PREPARED BY:
UWP CONSULTING (T) LTD
P.O. BOX 8181
DAR ES SALAAM
TANZANIA
TEL: +255 22 2700341
FAX: +255 22 2700350
APPROVED BY: F.MTUI SIGNED: DATE:
DRAWN BY: G. WALL
SHARED DRAWING BY: M. RAJABU
CHECKED BY: L. KOBWAVA
SCALES: AS SHOWN
SHEET: 1 OF 1
SHEET SIZE: A 1
PROJECT
TANZANIA STRATEGIC CITIES PROJECT (KIGOMA)
TITLE
TYPICAL CROSS SECTIONS
DATE: FEB 2015
DRAWING No. 21887-KIG-156
REV. No. 0

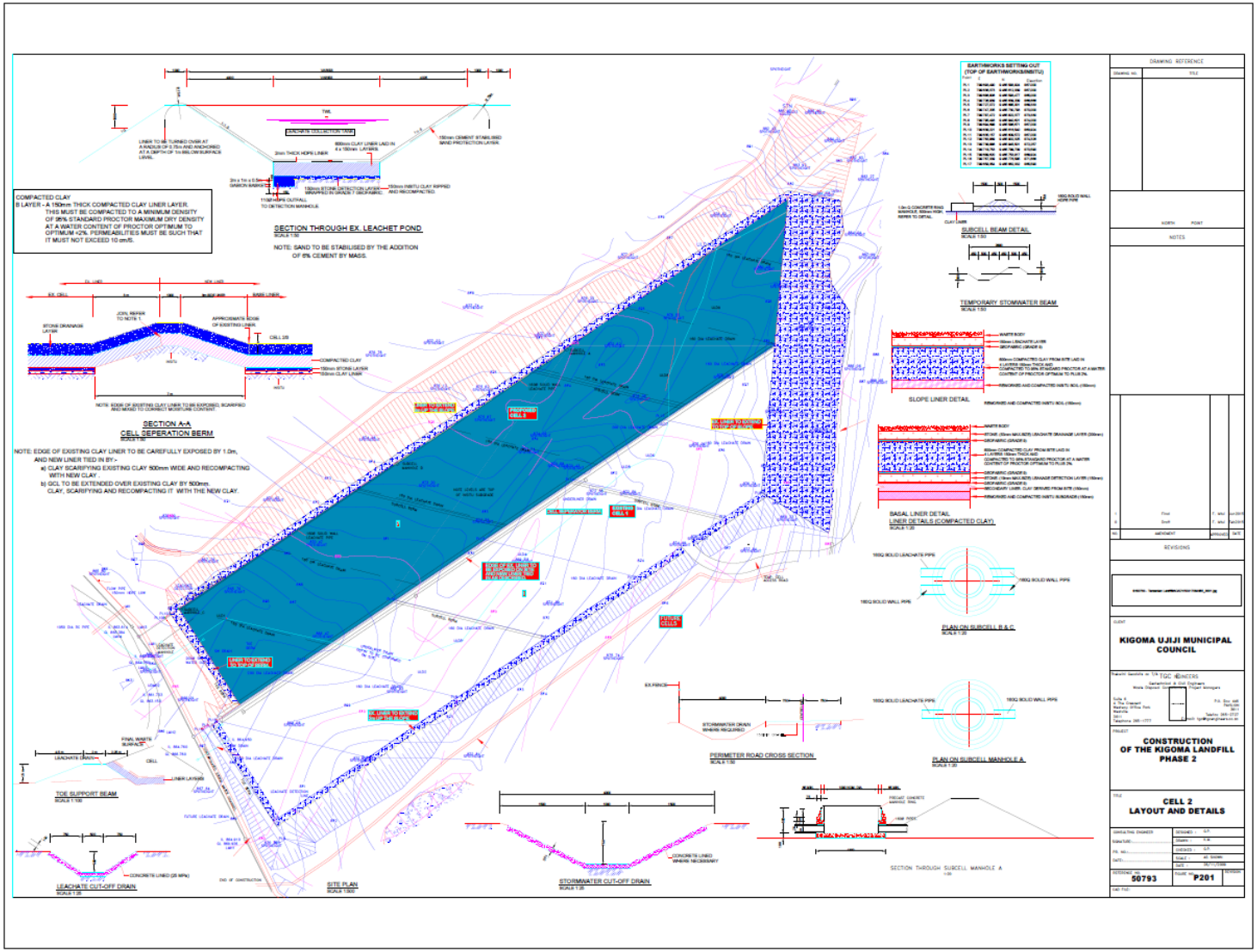

New Works
23x2900mm Parking Slots
PARKING SLOTS
New Works
37 Nos Ticketing Officee
THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
THE UNITED REPUBLIC OF TANZANIA
KIGOMA / UJIJI MUNICIPAL COUNCIL
REVISIONS
UWP CONSULTING (T) LTD
TANZANIA
PROJECT
TANZANIA STRATEGIC CITIES PROJECT (KIGOMA)
TITLE
LAYOUT PLAN OF KIGOMA BUS STAND
SCALES:
SHEET:
1 OF 2
SHEET SIZE:
A1
DATE: FEB 2015

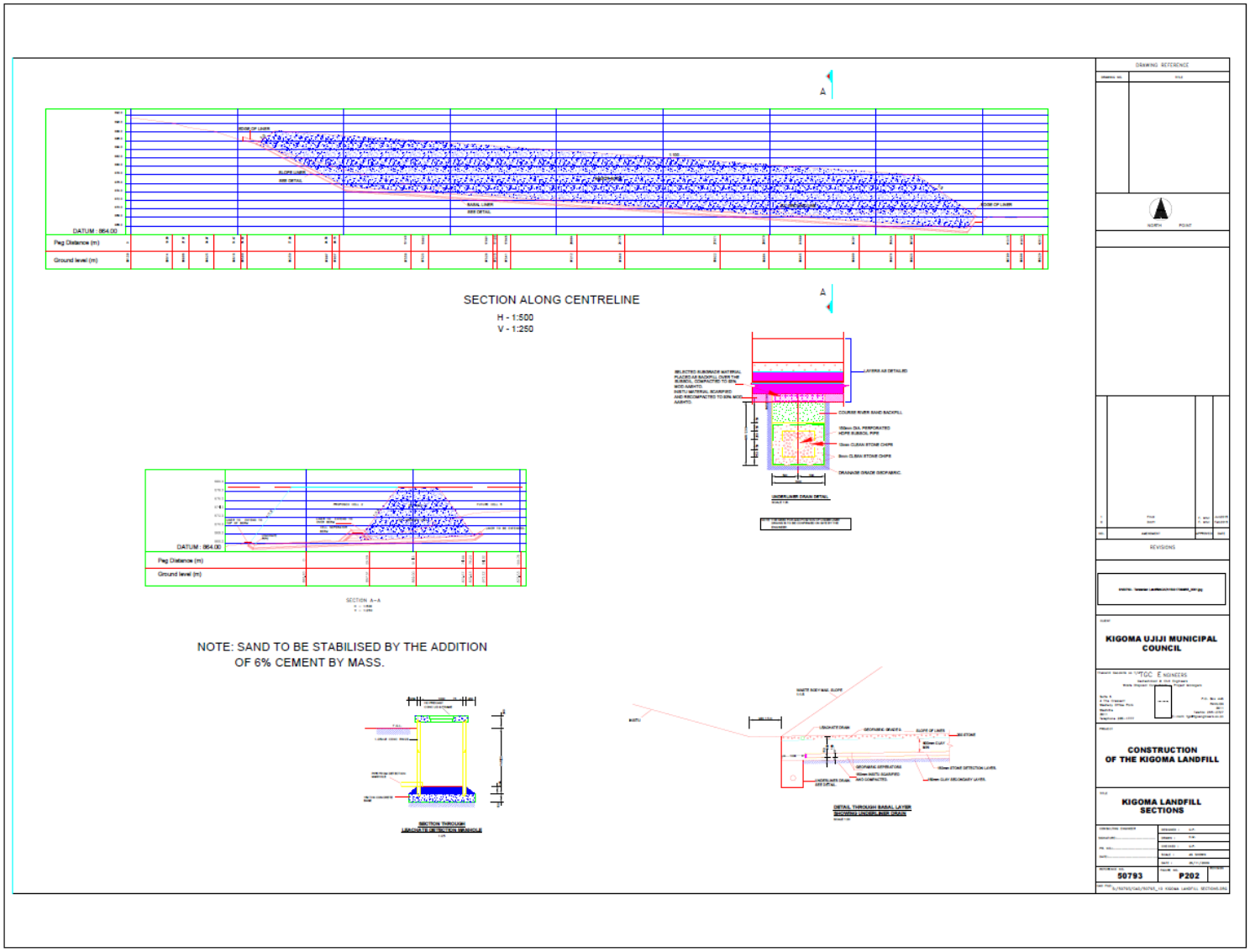

New Works
Existing Infrastructure
New Works
FRONT ELEVATION
New Works
Existing Infrastructure
New Works
FRONT ELEVATION
(Left hand side portion)
FRONT ELEVATION
(Intermediate portions)
FRONT ELEVATION
(Right hand side portion)
Existing Infrastructure
New Works
THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
THE UNITED REPUBLIC OF TANZANIA
KIGOMA / UJIJI MUNICIPAL COUNCIL
REVISIONS
UWP
TANZANIA
SCALES:
SHEET:
SHEET SIZE:
PROJECT
TANZANIA STRATEGIC CITIES PROJECT (KIGOMA)
TITLE
BUS STAND: FENCE/ELEVATIONS


CEMETERY
KGT46N
Kaaya Simu road
TB
EP
KGT47N
Royal Prince Lodg
CCM Office
Lumumba road
Final Grade After Siltation
Top Edge
Natural Bed Level
Lubengera Storm Water Drain Profile
with Erosion Protection Cascades
CHAINAGE
Datum 765
THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
UWP CONSULTING (T) LTD
TANZANIA STRATEGIC CITIES PROJECT(KIGOMA)
EROSION PROTECTION MEASURES - STONE MASONRY CASCADE
SCALES: AS SHOWN
SHEET: 1 OF 7
SHEET SIZE: A 3
DATE: FEB 2015
DRAWING No: LUBENGERA DRAINS


Design Level
Deposition
Riprap
-1.5%
300
Stone Masonry Wall
Existing Level
Height (H)
Stone Pitching
Deposition
-1.5%
400
300
200
BD
3000
STEP/CASCADE DETAILS
TYPE
DIMENSIONS (M)
H
Bw
1
3.5
3.4
2
2.0
1.9
STEP DETAILS
SCALE 1:20
B+0.4D
500
0.2D
B
0.2D
500
D
d
Weep Holes Where Instructed by Engineer
Grouted Stone Pitching
Detail A
Excavate and Replace soft material(if any) with approved selected granular material
DRAIN
DIMENSIONS(m)
D
B
KATUBUKA
1.5
4.0
RUBENGERA
1.5
5.0
TYPICAL SECTION OF THE DRAIN
SCALE 1:20
Grouted Stone Pitching (300mm)
Dia 75mm PVC Pipes weep holes (500mm long) Placed @1000mmc/c where instructed by Engineer
225
320g/m2 Geotextile membrane (225x225x225)
225
Permeable Material (CRS) wrapped in geotextile fabric
DETAIL A
SCALE 1:10
THE UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
REVISIONS
UWP CONSULTING (T) LTD
TANZANIA
SCALES:
AS SHOWN
SHEET:
SHEET SIZE:
A3
PROJECT
TANZANIA STRATEGIC CITIES PROJECT(KIGOMA)
TITLE
EROSION PROTECTION MEASURES - STONE MASONRY CASCADE AND STONE PITCHING DRAIN
DATE: FEB 2015


KIGOMA UJIJI MUNICIPAL COUNCIL
CONSTRUCTION OF THE KIGOMA LANDFILL PHASE 2
SITE PLAN
50793
P200
TGC ENGINEERS
NOTES ON OPERATION
1.2m HIGH FENCE TO BE ERECTED AROUND LEACHATE POND.
LEACHATE STORAGE POND GEOMEMBRANE TO BE PROTECTED BY 150mm STABILISED BAND.
CONTRACTOR TO FORM TEMPORARY ACCESS TO AREA OF WASTE FROM THIS SIDE.
EDGE OF EXISTING LINER TO BE CONFIRMED ON SITE
RAMP TO BE FORMED.
OUTLET UNDER ROAD
POTENTIAL CONTAMINATED STORMWATER POND
PROPOSED GRAVEL PATHWAY, 1.0m WIDE
TYPICAL SECTION THROUGH PIPE CROSSING
TYPICAL SECTION THROUGH CELL 2 ACCESS ROAD
SITE PLAN
LOCALITY PLAN
NOTE
LANDSCAPING AREAS OUTSIDE THE CELLS ARE TO BE TRIMMED, GRADED AND TOPSOILED AS DIRECTED BY THE ENGINEER ON SITE.
DRAWING REFERENCE
NOTES
REVISIONS


SECTION THROUGH EX. LEACHET POND
SECTION A-A
CELL SEPERATION BERM
SLOPE LINER DETAIL
BASAL LINER DETAIL
LINER DETAILS (COMPACTED CLAY)
TEMPORARY STORMWATER BEAM
SURCELL BEAM DETAIL
PERIMETER ROAD CROSS SECTION
PLAN ON SURCELL B & C
PLAN ON SURCELL MANHOLE A
SECTION THROUGH SURCELL MANHOLE A
TOE SUPPORT BEAM
LEACHATE CUT-OFF DRAIN
STORMWATER CUT-OFF DRAIN
SITE PLAN
KIGOMA UJIJI MUNICIPAL COUNCIL
CONSTRUCTION OF THE KIGOMA LANDFILL PHASE 2
CELL 2 LAYOUT AND DETAILS
50793
P201


SECTION ALONG CENTRELINE
H - 1:500
V - 1:250
NOTE: SAND TO BE STABILISED BY THE ADDITION OF 6% CEMENT BY MASS.
KIGOMA UJIJI MUNICIPAL COUNCIL
CONSTRUCTION OF THE KIGOMA LANDFILL
KIGOMA LANDFILL SECTIONS
50793
P202